Vol. LXVII., No. 2683.—Saturday, July 7, 1894.

THE BUILDER

ILLUSTRATIONS.

Design for a Frieze.—By Mr. Arthur Gwatkin ..... *Extra Large Ink-Photo.*
The Abbeys of Great Britain :—II. Rievaulx : Three bays of Choir, &c.—Drawn by Mr. F. F. Glennie ..... *Two Double-Page Photo-Litho's.*
A Pair of Houses, Melbury-road, Holland Park —Mr. Halsey Ricardo, Architect ..... *Double-Page Photo-Litho.*

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Waterworks Engineering.

WATER is not only an essential element for actual existence, but enters so into the economy of daily life, in the preparation of food and in the preservation of health, in agricultural operations and in manufactures—in fact, it is so indispensable a factor in all domestic and industrial concerns, to say nothing of the charm it imparts to the landscape, and its important contribution towards physical recreation—it is no wonder that a study of its various properties, of the laws by which it is governed, as well as its management for all purposes, should have attracted so large a share of attention amongst scientific and practical men from the earliest times. The authors of the treatise under the title of "Waterworks Engineering"* deal mainly with one branch of the subject, and have therefore confined their attention to such particulars as are connected with the supply of water for domestic uses, only incidentally touching on those questions which would be included under the more general title of Water engineering. While ostensibly professing to deal only with "Principles," the authors at the same time extend their investigations into the methods and the results obtained in actual practice; indeed, had they not done so, their treatise would have had to be classed with many other publications, excellent as far as theoretical instruction is concerned, but of comparatively little assistance and use to the engineer, who has not only to design his projects but to carry them into execution.

Experiments on the laws which govern the flow of water have been mainly conducted on so small a scale and with an absence of many of those conditions which obtain from variation of climate, temperature, soil, effects of wind, storms, peculiarity of situation and surroundings, that though interesting and accurate in themselves they are nevertheless misleading when their results have to be applied under other conditions, especially where the collection, storage, conveyance, and distribution have to be conducted on a large scale. Of course, the theory and practice of engineering must go together; it is not safe for theory to override practice, nor can the latter be independent of the former; neither does it always follow that the purely theoretical expert is the fittest to be selected for the designer of a project. An excellent illustration in point of this fact was once made by an eminent engineer in reference to one who was a good mathematician, to this effect, that though he could calculate to the last drop how much water a given reservoir could hold, he was unable to lead a drop of water into it!

"Ἄριστον μὲν ὕδωρ" is true of water as man's best friend, but it is equally true that it can be a formidable foe, as those who have had to deal with controlling it under difficult circumstances can feelingly testify. A knowledge, therefore, of the nature and properties of the element itself, as well as of the materials and appliances necessary for its control, is essential to ensure correctness of design and safety in construction. The separate elements into which the subject is divided in the treatise are systematically and conveniently arranged and illustrated. Commencing at the fountain-head or source of supply, the student is conducted though the several operations until the water is delivered literally into the hands of the consumers, very few of whom have the least idea of the amount of thought, labour, and time that have been expended in order to accomplish the purpose of satisfying their daily and hourly need.

The quality of water supplied for domestic use of course forms an important item for examination. The lines on which such investigation should proceed are carefully explained, but one remark in connexion with "surface waters" is open to question—viz., that "such waters, if derived from hard rocks in a sparsely-populated and agriculturally

* "The Principles of Waterworks Engineering." By J. H. Turner, B.Sc., and A. W. Brightmore, M.Sc. London: E. & F. N. Spon

barren district, are well adapted for irrigation purposes." If by irrigation is intended its application to growing crops, it is obvious that when water is highly charged with fertilising matter, both in mechanical suspension and in chemical combination, it is infinitely more valuable than when it flows perfectly pure and clear. Opinions, too, are divided on the point as to the self-purification of streams during their flow, some authorities still maintaining that the oxidation of impurities is effectively carried on in rivers of large volume which run rapidly over a moderately long course, and so the remark, "that aëration and the agency of plants and animal life do not produce a much more marked effect than that of the limited extent formerly assigned to them," must be accepted with some reservation.

In the chapter devoted to the "Measurement" of water, instances are quoted of extraordinary falls of rain in various countries. Perhaps few persons are aware that at any place in the British Isles so large a fall as seven inches in twenty-four hours could possibly be recorded, as at Seathwaite; but in countries subject to the influence of tropical monsoons much heavier falls frequently happen. It is, however, rare for storms of excessive rain to be spread over a large area. Even in the basins of the largest rivers, both in the Eastern and Western Continents, such storms never occur simultaneously over the whole extent of the basin.

The gauging of streams and rivers with a view to determining the proportion of rainfall which becomes actually available requires, in the case of small volumes, a series of very careful observations. The application of formulæ deduced from experiments conducted in small artificial channels is quite misleading in the case of large rivers; so many local peculiarities arise to render even the most careful observations inapplicable, not only to rivers of similar type, but even to the same river when made by different observers, as, for instance, those on the Mississippi, by Mr. Ellet, which differ from those made by Humphreys and Abbott, of the U. S. Engineers, who were amongst the first to discover that the maximum velocity in large rivers is found, not at the surface, but at varying depths below it, owing to the friction of the air and also to the direction and force of the wind prevailing at the time of observation. In Messrs. Turner and Brightmore's treatise the intricate questions connected with determining the maximum and mean velocities on which the accurate measurement of water depends have been exhaustively investigated. The theories and experiments of well-known authorities have been analysed and compared, and elaborate calculations of formulæ reduced to simple terms. It is not necessary here to particularise the various methods and mechanical appliances employed in the measurement of water for collection or distribution, for they are carefully enumerated and their respective merits clearly discussed, so that the engineer can easily make his selection of any he considers best suited to his requirements. But paragraghs 136-140 deserve special attention, as they contain an interesting description of the diamond-drilling apparatus used in borings for water. It is perhaps known to but few that such borings have been carried down to the depth of a mile and more, as at Schladabach, in Prussia, where a bore with a diameter of 11·2 in. at top and 1·25 in. at bottom has been driven 5,734 ft. But the temperature of water is found to increase so much at great depths (1·8 Fahr. for every 100 ft. is the rate in England) that it is questionable how far it is desirable to supply water of such temperatures for domestic purposes.

Chapter IV. is devoted to the important item of "Storage," to which more attention has been directed perhaps than to any other branch of water engineering. The Creator "binds up the waters in His thick clouds, from whence they drop and are distilled upon man abundantly," but it is left to man to collect and store those waters and prevent their running off wastefully to the sea. Hence the constructors of reservoirs have been from the earliest times considered as benefactors of their age, and, more especially in Eastern lands, remains have been found of structures which for vastness of conception and excellence of work will compare favourably with the works of more modern days. The progress of science of course has conferred advantages on the engineer of these days by enabling him to employ the material at his disposal with greater economy, but modern structures have not by any means dwarfed the magnificent works of bygone centuries. There are many reservoirs in India with lofty embankments and water-areas covering several square miles. In nothing has the skill of those old native engineers been exhibited more than in their selection of sites and in the adaptation of the material ready to their hands; but masonry dams are certainly few in number.

The subject of storage is very thoroughly dealt with in the treatise. In our islands, where the yield and supply of water available are not so enormously disproportioned as in the large eastern and western continents, many points have to be considered, which need not otherwise occupy attention so far as site and size of the work are concerned; but too much care cannot be exercised in regard to the materials and relative dimensions of reservoirs, for a catastrophe such as the bursting of a dam commanding densely populated cities or towns means an overwhelming calamity, involving loss of life and property beyond calculation. It is, therefore, indispensable that no possible precaution which human knowledge or experience can devise for ensuring absolute safety should be neglected. The form which such precautions should take is carefully analysed and set forth by the authors, both as regards earthern embankments and masonry dams. There is not much difficulty in determining the dimensions of the former class of works, or in calculating the resistance to the mere statical pressure of impounded water. A great deal of stress, however, is laid upon the puddle wall in respect of material and dimensions, and of the position in which it should be placed. Doubtless there are reasons for such walls in this country, but in India no such thing exists in the many thousands of reservoirs which have been constructed by native engineers. It is quite a debatable point, when a puddle wall is necessary, as to whether it might not be preferably and more profitably utilised in covering the inner slope, rather than in the centre of an embankment. It would, of course, have to be revetted with a thick pitching of large, roughly dressed stone, which in any case, however, would have to be provided as a protection to the inner slope against the action of waves during severe storms.

The weak point in most earthen embankments of earlier construction is truly shown to be the position of the outlets and waste weirs. No more hazardous arrangement could have been adopted than that of building the discharge sluices or pipes in the centre of the embankment itself. In the case of large and deep reservoirs they should, as recommended, be carried through the solid ground on either flank.

As regards the relative merits of earthen or masonry dams, a great deal depends, as the authors remark, on the quality of the material available at the proposed site and the consequent relative cost of construction. As a matter of fact, however, homogeneity of the mass can be secured with greater certainty in carefully-constructed dams of earth than in a masonry wall of great thickness. A case of settlement can be more easily remedied in the former than in the latter, and an earthen dam gives longer warning of any weakness or sign of yielding than a masonry one, and so allows time for relieving the pressure by partial emptying of the reservoir, whereas the collapse of a masonry structure is comparatively instantaneous and therefore correspondingly disastrous. The time, too, occupied in construction is much longer in the case of masonry, and is more than proportionately costly. But there are sites, of course, where only a masonry dam is possible, as, for instance, in the present disputed site of the proposed dam across the Nile at Philæ, the demerits of which have already been discussed in the columns of this and other periodicals. The calculations involved in the case of high masonry dams are more complicated, and have formed a subject of very close investigation by many distinguished engineers and mathematicians. The essential conditions of strength and stability are stated in paragraph 224, and subsequently worked out in detail both mathematically and graphically, and the results are conveniently tabulated at the close of paragraph 242, in which it is shown that for a dam 111 ft. high the breadth at base must be 74·6 ft., and for one 150 ft. high, the base breadth must be increased to 113·3 ft., while the weight of masonry is raised from 264 tons to 493 tons, or at the rate of nearly 500 tons for each foot in length. An idea may thus be formed of the extreme care which must be exercised in the actual building, in order to secure homogeneity in such an immense mass of masonry.

One type of masonry dams, sometimes, but not commonly adopted—viz., the "arched form," is also described and illustrated; diagrams, with particulars of dimensions, are furnished of two such works which have been erected in California—viz., the Sweetwater and Bear Valley Dams, 90 ft. and 64 ft. high respectively, in which the breadth at base in each case is less than that prescribed for straight dams. All the instances of arched dams mentioned apparently consist of a single curve from bank to bank, but there exists near the City of Hydrabad in the Deccan a dam of unique form, comprised of a *series* of arches, and resembling a bridge thrown on its side. It is difficult to conceive what advantages the designer of this work could suppose were gained by the adoption of this particular form, which can only be regarded as a curiosity in its way.

The precautions to be adopted in the construction of masonry dams recommended in paragraph 256 are much to the point, especially in regard to the use of a slow-setting hydraulic lime. In tropical countries, where the heat of the sun and dryness of the air are so great during the rainless season, that precaution is well understood. Not only is the mortar used very wet, but all the material, whether brick or stone, is saturated so as to reduce the loss by rapid evaporation and absorption of the moisture from the cement. As an additional precaution, sand is spread over every fresh course of masonry and kept constantly wetted, so as to allow the process of setting to take place gradually and thoroughly.

The chapter following that of storage is devoted to the subject of the purification of water previous to its distribution, and a description of the various processes adopted at home and abroad for separating the mechanical and chemical impurities found therein. As to the relative efficiency and economy of the different methods employed, opinions will, of course, differ, and they necessarily depend, more or less, on the different constituents of the water dealt with, and the locality from whence it has been drawn. The degree of "hardness" is a question which much exercises the mind and the temper of the female householder, and, perhaps, the familiar advertisement of "Don't worry—try Sunlight" may prove to her, after all, the quickest practical solution of the difficulty. There is one point, however, for which there is much to be said on both sides, and that is how the condition of purity arrived at can best be maintained during the interval of time that must necessarily elapse between the treatment of water and its supply to con-

sumers; that is, which is the best location for purification works—whether they should be placed nearest to the intake or to the centres of distribution. The opinion recorded is that "naturally filtered water should be protected from the light until it is supplied to the consumer, and that it is in the highest degree essential for every kind of water intended for dietetic use to be maintained at a low and equable temperature after it has been brought into a pure condition."

The "conveyance" of water for domestic use must obviously be preserved from all contaminating influences. In ancient times open aqueducts, of which such remarkable monuments exist in the Roman Campagna, were universal, though even in those days, as the Pompeiian Museum reveals, both iron and lead piping were employed in public baths, and for individual houses of the wealthy classes. The advance of civilisation however demands, and improvement in the mechanical arts admits of, an economical compliance therewith, the substitution of underground iron aqueducts, the dimensions of which can be accurately adjusted to the wants of each locality. Hence the discussions which have arisen as to the most suitable arrangements for the conveyance of water in main conduits and for an exact control over its distribution in detail, questions which are treated in the sixth and seventh chapters, and which have necessitated many ingenious experiments on the motion of water in pipes, and somewhat intricate calculations to determine with accuracy the volume deliverable under many varying conditions without unnecessary waste. One condition, the failure to observe which is a prolific source of trouble and annoyance to the householder, especially during winter, is the necessity of allowing a considerable excess of strength in pipes to meet the extra strain occasioned by expansion during the process of freezing, and the effect of impacts from the sudden arrest of motion in a column of water under a very high pressure. The full force of this impact, sometimes known as "Water Ram," cannot be determined by calculation, but its effect has been demonstrated in an experiment by Mr. A. R. Binnie, in which the pressure on a ¾-in. pipe, 114 ft. long, and branching off a supply-main and furnished at the end with a plug-cock, measuring 0·152 of an inch, was at the branch 120 lbs., and at the open cock itself 20 lbs. On the cock being shut quickly those pressures were for the moment found increased to 220 lbs. at the branch and 550 lbs. at the cock! The strain thus suddenly caused may be imagined, and illustrates the force which may have to be provided against.

The treatise concludes with the last and not altogether least important subject of "Maintenance." In every branch of water engineering, the best-constructed system of works will fail to be satisfactory unless systematically and carefully maintained. The remarks with which this point is urged are very true, that maintenance should at the outset occupy the consideration of the engineer conjointly with the capital outlay likely to be involved by any proposed project, and that, "in a comparison of rival schemes, the prime cost of construction must be regarded as only one of the factors that are to determine their relative merits." Of course, with the question of cost of maintenance must arise the price to be charged to the consumer. Judging from the value put upon their property by the respective Metropolitan companies, and the high market value of their shares, the rates now levied by them must be very considerably in excess of the actual outlay incurred in maintenance, so that the powers conferred on them by Acts of Parliament might with much propriety, and without hardship to the shareholders, be now revised. There are several anomalies, and an absolute want of equity, in the powers given to charge for baths and water-closets. The demands of nature do not correspond to the number of conveniences of either kind in a house. Some more rational mode of charges may surely be adopted than making, say, five persons pay for their morning ablutions five times as much for the privilege of performing them simultaneously in five separate baths, than consecutively in one bath. In the other case it is equally, if not more, absurd. Of course, it is argued that there is so much waste, and doubtless there is, but this only means that careful householders are taxed for the careless. Naturally the true remedy that suggests itself is payment according to quantity used, as for every other article bought in the open market; but to this it is remarked that the legislature of this country has shown itself as consistently opposed to the sale of water by measure for domestic consumption. It is also remarked that "the difficulties inseparable from attempts to measure domestic water supplies with extreme accuracy have not been entirely overcome." Be it so, but *is* "extreme accuracy" required? It will not be contended that there is any accuracy at all in the charges which are made under existing powers. There is certainly ample margin left to cover inaccuracy, judging from the enormous dividends of the companies under the present irrational system. There is perhaps more reason in the other argument, that the cost of introducing the system of measurement into towns in this country would be often prohibitive. It has not, however, been found so in the case of gas consumption; but if the prohibition of costliness is a comparative term, referable rather to the diminution of existing dividends than to actual prime cost, the argument is not tenable in the light of the public interests. This is, however, by the way, and but an opinion on as yet an untried measure.

Messrs. Turner & Brightmore's treatise is in every respect a valuable contribution to the literature of the profession for whom it has been compiled, and its authors would certainly have met with commendation from the distinguished engineer to whose memory their work is dedicated.

NOTES.

AT a meeting of the Archæological Institute on Wednesday afternoon, Mr. Somers Clarke, who has recently spent some time in Egypt, read a very effective paper on the question of the proposed Nile dam and its effects, under the title "The Devastation of Nubia." The main point of Mr. Clarke's paper was that, even if a position were taken for the dam which would not affect the island of Philæ, a large number of other monuments would be destroyed over a length of 116 miles in the course of the river, including the remarkable temple of Kalabsheh; he gave a list of sixteen remains of important buildings which would be lost. Describing in detail the remains on the island of Philæ, he pointed out many minor remains of interest on it besides the more prominent and well-known ones, and showed that the scheme of raising or rebuilding the larger structures, even if one could admit that as any satisfaction as far as they were concerned, would still leave a great quantity of interesting remains to be submerged. He also estimated that from 25,000 to 30,000 people of the lower order would be drowned out of their homes and have to find some other place to live, and that no provision or consideration had been made for these. Mr. Clarke pointed out also that Mr. Willcocks, the engineer who had brought forward the whole scheme, had shown his ignorance of Egyptian antiquities by the very remark that he had prepared an alternative scheme which would avoid touching Philæ, he being apparently entirely unaware of the other remains — Kalabsheh, Kom Ombo, Debod, Tafeh, Dendur, Dakkeh, &c.— which would be destroyed even if Philæ were spared. In the course of the discussion, Mr. Petrie expressed a fear that the bait, as he called it, of eight millions a year of prospective profit, was too strong an appeal to the predatory instincts of the Egyptian Government and the trading classes to leave any hope that we could prevail against the scheme on the mere ground of the interest in antiquarian remains; the most we could hope to do would be to endeavour to procure that the least mischievous scheme should be adopted out of the four proposed. The paper was illustrated by plans of Philæ and Kalabsheh and of the Nile basin, and by a number of water-colour drawings of the various temples by Mr. R. Phené Spiers, who also took part in the discussion.

THE German architects are to have their biennial congress next month at Strasburg, where great preparations have been made to ensure the success of the meeting; and as many interesting papers are to be read, and a number of modern monumental works can be seen in the city, the meeting will probably be a good one. An elaborate volume on Strasburg architecture, past and present, is being published, and will form a valuable addition to the series which is now regularly appearing on the different modern German cities. As in former cases, each member of the Congress will be presented with a copy. The actual business meeting of the executive of the Amalgamated Societies of German Architects and Engineers takes place a few days previous to the general gathering, and it will be there that the programme of the technical research and publishing to be done by the allied societies during the next two years will be arranged.

THE report of Dr. Orme Dudfield to the Vestry of Kensington, on the sanitary condition of the parish for the four weeks ending June 16, contains a useful historical sketch of the progress of the efforts which have been made for a good many years past, and in which Dr. Dudfield and his vestry have been active, towards the compulsory sanitary regulation of bakehouses. For years Dr. Dudfield has been urging that some authority should have power to make and to enforce by-laws for the sanitary regulation of bakehouses. No authority has, however, as yet been given any such power, though there seems to be some probability that the London County Council will eventually be empowered to make by-laws on the subject. The power of entry to bakehouses was, however, given to sanitary inspectors in the Factory and Workshop Act of 1891, and Dr. Dudfield expresses the hope that, whoever may make the desired by-laws, the duty of enforcing them should still rest with the local sanitary authority.

IT appears from some recent notes of the *Times'* Paris correspondent that the French have just discovered the existence of a painter named Turner, one of whose works it has been proposed to present to the Louvre. It is to be hoped they may go on and discover the existence of Constable and Crome and one or two other English painters who are the real fathers of the recent French school of landscape—the school of Dupré, Rousseau, and Corot—and are influencing French painting at the present moment, though their names seem to be unknown to the French art-critic of the day.

WE read that Mr. William Japp, of Broomhall, has lately effected a restoration of the house in which lived, *temp.* Robert III., Katharine, the Fair Maid of Perth, daughter of Simon the Glover, having purchased it from the local Guild of Glovers. In the times described in Scott's novel that fraternity had their shops and homes for the most part in the Skinnergate, but their archives show they possessed considerable property, consisting of land and houses, in Curfew-street, or row (where dwelt Simon

the Glover), which surrounded the castle yard, and had been first built, probably, soon after the castle was razed, and its moat filled up, by Robert Bruce. Curfew-row has since enclosed the Skinners' yard, formerly the castle court-yard, but was then a thoroughfare or avenue, leading from the north part of the town to the outlying Black Friars monastery. The Dominicans' gardens, renowned for their extent and beauty, adjoined North Inch; Rose and Barossa streets, the Crescent, and Atholl-place cover a portion of their site. At the south end of Rose-street stood, it is supposed, the Gilten Arbour, or summer-house, from a balcony whereof King Robert witnessed the conflict between the clans Quhele (perhaps Kay) and Chattan, in which Torquil and Hal o' the Wynd engaged so fiercely. Monks' Tower—a round watch-tower at the town's then south-east angle—was situated by the corner of the Earl of Gowrie's garden; it had a ceiling painted with many strange allegorical and astronomical devices, copied, they say, from those on the Gilten Arbour; and was pulled down, together with Gowrie House, in 1807. In the wall of the corner house in Curfew-row, by the Blackfriars' Vennel, is a niche wherein hung the curfew-bell. This house formed part of St. Bartholomew's Chapel, where the Glovers held their trade meetings. Gowrie House, bestowed by the magistrates in 1746 upon the Duke of Cumberland, lay just east of the junction of South (*olim* South High) street and Watergate, near the Tay's right bank, where are now the County Buildings and Gaol.

IT is stated that the Dean and Chapter of Peterborough have instructed Mr. Pearson to design a memorial to Queen Katharine of Arragon, and will also erect one in the cathedral to Mary Queen of Scots. Concurrently herewith, attention has been directed to the condition of Fotheringhay church. Mr. H. M. Townsend, A.R.I.B.A., of Peterborough, writes to a daily contemporary:—

"I can fully confirm the opinion that this noble building is in a most dangerous condition. At the request of a former incumbent I made (in 1882) a careful examination of the fabric, and at that time the roofs of the nave and aisles, and several of the beautiful flying buttresses, were found to be in a dangerous state."

Deformed by the loss of its earlier choir, Fotheringhay church, its tower surmounted by a later octagon lantern, and spirelet with a falcon and fetterlock for vane, stands on the river's left bank, a conspicuous landmark in the Nene valley. It was given to the convent of De la Pré, near Northampton, by Simon de St. Liz, second Earl of Northampton, who founded it, as a vicarage, *temp.* Henry II. In 2 Henry V. the abbess gave it to the College of the Virgin and All Saints founded at Fotheringhay by Edward, Duke of York, 1412, in place of an ancient nunnery there. Edward, before he went to France, where he fell at Agincourt, agreed to pay William Harwod, "freemason of Fodringey," 300*l.* for rebuilding the body of the church—as now—to be 80 ft. by 60 ft., with two aisles, each having six buttresses, a west window of four lights and five side windows of free-stone, like those in the choir, a clearstory with windows to correspond, a tower 80 ft. high, 20 ft. square within its walls 6 ft. thick, a north porch 12 ft. long, a west door, and a south porch joining the cloister-door. Edward IV. refounded the college, whose possessions in many counties, including property in Holborn, City of London, are assessed in a survey of 1535 at 489*l.* 15s. 9d. yearly. Leland says in his "Itinerary":—

The fair cloister . . . was made in King Edward the IVth.'s days, one Felde being master of the college. . . . This Felde set the verses of the book called *Æthiopum terras*, in the glass windows with figures, very neatly.*

* He means the Eclogue of Theodulus, Bishop of Palestine, *obiit* 480. In Bridges' "Northamptonshire" are drawings of all the figures in the windows, the vacant spaces of which are filled with bucks, lions, roses, angels with harps, and the falcon and fetterlock—a cognisance of the Dukes of York.

Edward IV. brought hither from Pontefract the body of his father Richard, slain at Wakefield, for burial on the high altar's north side; here, too, were buried Edward, Duke of York; Richard's son, the Earl of Rutland, murdered by Lord Clifford; and Richard's wife, Cicely Nevill, who passed thirty-six years of her widowhood at Fotheringhay Castle, where she gave birth to Richard III. Camden tells us that all these had magnificent monuments, which were demolished, together with the chancel, their bodies being thrown into the churchyard, by the Duke of Northumberland,* who also pulled down the college, given to him *temp.* Edward VI. On visiting Fotheringhay in 1573, Elizabeth ordered two monuments to their memory to be put up in the church, and that a stone bridge should replace the wooden one across the Nene. Edmund of Langley, Duke of York, rebuilt Simon de St. Liz's castle at Fotheringhay, and planned its keep in the shape of a fetterlock; he acquired it from Mary of Valence, Countess of Pembroke; it passed subsequently to Henry VII.'s consort, and then in dower to Katharine of Arragon. The popular error that James I., moved by filial piety, pulled down the castle is refuted by the fact that he bestowed it upon Lord Mountjoy, and by a survey made April 3, 1625 (a few days after the King's death), which specifies its several buildings, two ditches, &c. The central mound remains, the outworks and the moats can still be traced. Authentic views of the castle are rare; we know not what trust may be placed in the representation of the hall in the "memorial" whole-length portraits of Mary Queen of Scots that were lent to the Stewart Exhibition, 1889, by Her Majesty, Lord Darnley, and Blair's College, Aberdeen.

A CORRESPONDENT sends us the bill for the last mitre made for Worcester Cathedral. The details are derived from the private account-book of the last Prior but one. This book, still in the possession of the Cathedral Body, contains, amongst other matters, the bill for a mitre for the monastery. We may believe it the last made—firstly, because the accounts from which the bill is taken make no mention of any other; secondly, because in the time of the next Prior the whole monastic body was dispersed by Henry VIII. Our bill tells us nothing of the shape of the mitre, but we may, from portraits, &c., conclude its appearance to have been much like the cumbersome form we are all familiar with. The following is the account, the arithmetic is faulty:—

"Item to John Cranckes, gold smyth of london, for al maner of stuff belongyng of the new mytur with the makyng of the same as hit apereth by parcelles foloyng:—

In primis, for v grete stones	xvjs. viijd.
Item, for $\frac{xx}{iiij}$ & vj† stones, prece viijd. apeece, to the frontes	lvijs. iiijd.
Item, for xxj stones, sett in golde, weyng di. vnces.....	xiijs. iiijd.
Item, for xl. medyll stones, prece vjd. a stone	xxs.
Item, for $\frac{xx}{ij}$ & xv smale stones, prece iiijd. a stone, to garnesshe	xxvs.
Item, for ij vnces & a quarter of fyne peerll, at iijli. the vnce	iijli. xvs.
Item, for ij vnces of medull peerll, at xs. the vnce	vjli.
Item, the seluer warke weys in all $\frac{xx}{iiij}$. xiij vnces; whiche is, with the fassheon‡ & all.....	xxiiijli. xvjs.
Item, to the broderar vj wokes, § xijd. a day besydes mete & dryncke	xxxvjs.
Item, payd for lynnen cloth to cowechе ytt on, with perll.....	vij d.
Item, for Sylke, to thred the seid perll & steche the peerll, j vnce & di.....	xv d.
Item, for yalow thred	j d.
Item, for Rybande of iiij d. brede, ij yeardes	viij d.
Item, for Reband of ij d. brede, A yearde	ij d.
Item, for Rownde selke abowt the bordure	j d. ob.
Item, for red selke, to sow hytt withall, di. quarter the vnce	ij d. ob.
Item, for past	iiij d.
[Item] for a quarter of sarcenett to lyne hytt	xiiij d.
Item, for a case to the mytur, of lethur ..	iiij s.

Summa xlix li. xv s.
the costes of the mytur."

* The oak sedilia or stalls are in the neighbouring church of Tansor, restored by Mr. Ewan Christian; see the *Builder*, July 3, 1886.

† 86. ‡ Unintelligible. § Probably wekes.

ONLY a few weeks ago, the city authorities of Glasgow made themselves ridiculous by finding out impropriety in engravings from some well-known pictures (Sir F. Leighton's "Bath of Psyche" among others), which thousands of innocent persons have looked at without suspecting that they were condoning immorality. The authorities of the city of Preston seem to have been determined, in American phrase, to "go one better" than the people of Glasgow. If we are correctly informed (it seems almost incredible), the Harris Museum at Preston has just been purified by the turning out from its precincts of a plaster cast of Michelangelo's "David," by order of the authorities! We could understand objection to some nude statues, both ancient and modern; we should have a certain sympathy with an official objection, for instance, to the Venus de Medici, an essentially vulgar work; but an objection to Michelangelo's David could only be sustained on the ground that all nude sculpture is *ipso facto* improper. In that case there is an end of sculpture. Do the Preston authorities intend also to hang a sheet in front of Mr. Mullins's fine figure of the Athlete, in the pediment of the Harris Institute?

LETTER FROM PARIS.

THE principal committee of the 1900 exhibition is already occupied with the classification of the exhibits, which according to the scheme of M. Picard, the General Commissioner, are to be divided into seventeen groups. Without enumerating all these, we may say that works of art will form the second group, subdivided into separate classes; class seven, paintings and drawings; class eight, engravings and lithography; class nine, sculpture and medallions; class ten, architecture. There now remains the important question of the public competition, which ought to be arranged at once. The architects and engineers all desire the prompt solution of the problem of providing so many constructions in so short a time.

The Café Riche, a building formerly so celebrated, and which for so many years was the centre of attraction of the "tout Paris" of the Boulevards, has been metamorphosed into a "Brasserie," following the taste of the day, which prefers the violent and gaudy decorations now in fashion, to the old wood-work in white and gold; this transformation is interesting from an artistic point of view, for the architect in charge of it is no other than M. Albert Ballu, who has not only engaged well-known artists to paint the ceilings, but has sought the aid of such decorative processes as ceramic, enamel, and mosaic. Without speaking of the rooms which MM. Barrias, Dubufe, Doucet, and some others have decorated with more or less success, we will confine ourselves to the decoration of the façades towards the Boulevard des Italiens and the Rue Le Pelletier. At the level of the first story M. Facchina has executed a long row of panels in mosaic, after cartoons by Forain, the caricaturist. Newspaper-sellers, cyclists of both sexes, jockeys and bookmakers, scenes at the ball, and scenes at the restaurant, succeed each other with the same commonplace and crude colouring, in a framework of gold enamel. The general effect may be original, but it is deplorably anti-architectural. Add to this figures of women in modern costumes, carved in alto-relief and highly coloured, and you have an *ensemble* which is absolutely astounding. If this is the new decorative art of the future, Heaven preserve us from it and bring us back to the taste of the good old times, to the simple illuminated escutcheons of our fathers, as we see in some examples at the Musée Carnavalet, which, if they had little artistic pretension, had at least the merit of picturesque effect. Let the architects leave M. Forain to his lively caricatures in rather doubtful taste, and if they wish to utilise mosaic—which we entirely approve of—at least let them

associate it with an ornamentation really decorative and harmonious.

The École Polytechnique, which recently celebrated its centenary, must soon receive important additions, and this is made the occasion for again demanding its removal outside the city. The members of Parliament who represent the Seine-et-Oise department insist strongly that the school ought to be rebuilt at St. Cloud, on the site of the old château; which would be a deplorable step. The ruins of St. Cloud have now entirely disappeared; in their place extend large terraced gardens, communicating by stone steps with the alleys of the Park. The effect of the grassy lawns on this rising ground is charming, the view from it equally so, and the rebuilding the École Polytechnique on that site would be an act of vandalism for which Parliament will hardly make itself responsible. Nevertheless, in regard to artistic perception, that same Parliament leaves much to be desired. Several of the Paris papers have criticised, not without reason, the indifferent manner in which, when the two Chambers are united to elect a chief of the State, the dignitaries of the Senate take possession of the most interesting apartments, historically and artistically, of the Palace of Versailles. Thus M. Challemel-Lacour, President of the Senate, installed himself a few days ago, with his family, in the apartments of Louis XV., and, accordingly, the workmen of the Mobilier National brought his furniture in all forms and styles into the midst of the delicate work of the old Louis XV. chambers. Whatever care may have been exercised over this provisional installation, it cannot but cause anxiety to those who appreciate the marvellous work with which the art of the eighteenth century has adorned this portion of the Palace. Parliament really ought to put a stop, for the future, to this transformation of a National Museum of French decorative art into a "Hôtel Meublé."

Twenty-five architects took part in the competition opened by the Société des Architectes Français. The subject of the competition was "Une Villa aux Environs de Paris, à Destination d'Habitation Permanente." After examining the designs, the jury, presided over by M. Havard, awarded to M. Étienne Perrin the first prize, offered by the Minister of Fine Arts. The second prize, offered by the Minister of Commerce, was awarded to M. Fernand Lorain. M. Louis Lahaure obtained the third prize, offered by the Chambres Syndicates des Bâtiment. M. Charles Girond received the fourth prize (a silver medal), and MM. Bricard and Brossart the fifth and sixth prizes (bronze medals). These three last prizes were given by the Société Nationale.

The annual exhibition of the "Envois" from the Villa Medici has just been opened at the École des Beaux-Arts. It consists of a number of very mediocre efforts, among which an interesting work is found here and there. One of these is that of M. Dewambez, who has certainly more qualities of colour and originality than most of the pupils of the school. He has treated the legend of Saint Agatha in a strongly accentuated style, and entirely in defiance of the conventions of the "École." M. Dewambez has certainly a special talent which is likely to bring him into notice, when he has once got rid of those influences of the atelier which so often paralyse the first efforts of young students. We like also the Pegasus of M. Lavailley, who, however, seems to be hesitating very much between classicism, impressionism, and what must now-a-days be called the "pointillisme" invented by M. Henri Martin. Mr. Lavergne has sent a well-studied figure of "David," but which has no very special character.

In architecture the drawings of M. Sortais (part of Hadrian's Villa), M. Pontremoli (restoration of the arch of Trojan at Ancona), and MM. Eustache and Bertone (various studies and fragments), testify to serious study, and are very well executed. The "envois" in sculpture are not of much interest, with the single exception of the "l'Ouragan" of M. Lefebvre, vigorous enough, though somewhat heavy.

M. Coutan has been appointed professor for the evening classes in sculpture at the École des Beaux-Arts, in place of M. E. Barrias, who has been appointed a member of the Conseil Supérieur. While we are speaking of the École, we may indulge in a word of criticism as to the monument to the architect, Rougevin, recently erected near the Cour du Mûrier. The mosaic column, with its gilt capital seen against a strongly-coloured background, has not a good effect, and contrasts disagreeably with the architectural character of the Regnault monument, and the simple lines of the "Jeunesse" of Chapu, in its immediate neighbourhood.

THE COMPETITION FOR THE RECONSTRUCTION OF THE ST. MARYLEBONE PUBLIC BATHS AND WASHHOUSES.

THE result of this competition was briefly noted in our last issue. The expenditure of a sum of about 40,000*l.* attracted no less than thirty sets of designs, which have been exhibited during this week. We cannot refrain from expressing regret that the Baths Commissioners did not pay more attention to the proper exhibition of these designs, as it is only fair to the architectural public which replies to their invitation to compete, and to the ratepayers and others who are interested in the proper expenditure of the money, that all the designs should be exhibited in one room, or at least in one building. This need was not met by the exhibition of the three premiated designs in the board room of the Baths Building and the remainder of the designs in a small house in Boscobel-place, some half-a-mile away.

The site upon which the new buildings will stand is now occupied by the existing baths. It is roughly shaped with frontages to Marylebone-road and Seymour-place; the interior angle is occupied by the Marylebone County Court. The facilities for lighting the interior were bad, and the light was principally obtained by the competitors from the two frontages, by top lighting, and by the provision of interior areas. To provide the necessary accommodation that the conditions required. was doubtless no easy matter, taking into consideration the restrictions of the site; and very few of the competitors have produced a really good plan, an essential in the design of a building of this description. The difficulties were not lessened by a request in the conditions that the existing Pompeian baths in Seymour-place should be retained if possible, with a view to economy, but it is open to question whether it would not have simplified the planning and given a better result if this portion had been boldly removed. Several competitors took this view. The conditions which were issued to competitors appear to have been prepared with care, and special attention was called to the economical working of the staff employed and its easy supervision, to the drainage and ventilation, and to the disposition and arrangement of all pipes and drains, so that they could be readily inspected and repaired. Separate entrances were required for first-class men, first-class women, second and third class men, and a private entrance for the commissioners and superintendent, and it was stated that the entrance for washers, second-class women's private baths, boiler-room, and coal stores must be in Seymour-place. With these restrictions the accommodation asked for comprised sundry additions and alterations to the existing Pompeian first-class swimming-bath for men, men's second and third class swimming-baths, a ladies' swimming-bath, and 110 private baths, divided as follows:—24 private baths and 2 vapour baths for first-class men; 55 baths for second-class men; 10 baths for first-class ladies; and 19 baths for second-class ladies. A wash-house and laundry was required, with 80 washing-boxes, hydros, and drying-horses, and a large ironing-room. A home laundry was also required. The staff department requirements included superintendent and matron's residence, board-room, and superintendent's office. A further restriction that was mentioned referred to the inadvisability of placing drying-horses or heating apparatus of any description against the premises of the Yorkshire Stingo Brewery on the west boundary.

Mr. John Johnson's design, which holds the first place in the assessor's award, shows great merit in plan, and gives the required accommodation with such direct communication as will give most ease in administration. The slipper-baths are shown with a single central corridor with baths on each side, so that complete supervision is readily obtained in a way that is impossible if cross passages are adopted. The ladies' first-class swimming-bath and private baths are in a readily-accessible position, on the east side, and at the same time the entrance has the privacy which is so desirable for this class. The staircase at the north-west angle for the superintendent is also a most useful feature, and gives access from top to bottom of the establishment; and the lavatory arrangements appear to be ample and well placed. Mr. Johnson has not feared to utilise heavy girder work and columns in carrying his main front over the two swimming-baths sunk below the forecourt and in projecting his first floor over the laundry roof, but though this is an additional expense, the simplicity of plan that exists almost justifies the means employed. The striking features in Mr. Johnson's plan are a very straight corridor to the Pompeian baths from a central hall on ground floor, from which a staircase leads to the men's second and third class baths under the forecourt, and staircases also lead to the baths on upper floors. The ladies' first-class swimming bath is on the east of the corridor, with private baths adjacent and accessible. The laundry is kept on a lower ground floor on the west side, and the engine and boilers are immediately below in the basement. The elevations Mr. Johnson proposes to execute in Portland stone entirely. The phase of Renaissance treatment is similar to Mr. Johnson's previous work, which is now well-known, but not much liked. The award of the first premium to this design on the strength of its plan cannot be well disputed.

The design of Mr. Saxon Snell, which takes the second premium, is considerably behind that of Mr. Johnson's in point of merit, the plan not being such a good one, though the elevations are better in some respects. The second and third class baths are placed under the forecourt, the ladies' swimming-bath being placed at the back and top-lighted. The ground floor has central entrance, with superintendent's office on west and board-room on the east side; the establishment laundry is placed on the west boundary, whilst the public laundry occupies a position at the back, with separate entrance from Seymour-place. The entrance to the Pompeian bath is also in Seymour-place, so that the means of communication between the separate departments is hardly so complete as it might have been.

The first floor is mainly occupied by the different blocks of private baths, which are not arranged in the best manner for supervision. They are lighted by large central areas, at the bottom of which are the top-lights of ladies' swimming-bath and the public laundry. The second floor plan is occupied by the superintendent's home.

Messrs. Ardron & Cheers secure the third premium with a design which does not appear to have many features in its favour as far as we have been able to see. The forecourt is occupied with the men's baths, and the ladies' swimming-bath is placed on the west side, with the boiler house and laundry establishment in the centre. The main angles of the building are either acute or obtuse, and no effort to secure squareness of plan seems to have been made. On the ground floor the washhouse occupies a central position, and has an entrance in Seymour-place, but the ironing-room is placed on the first floor, a doubtful arrangement. The first floor is occupied by the private baths, but their arrangement is not good for supervision, whilst the men's second-class baths are relegated to the second floor, where house accommodation is provided for the superintendent. The elevations are moderately good, but are much the better part of the design.

Of the remaining designs, exhibited in Boscobel-place, we can only speak in general terms and by their numbers; their merit is very varied. No. 1 places the two men's swimming baths in front, the ladies' in west side in basement. The shape of the baths is irregular, and the arrangement of boxes inconvenient, and the outside ventilation cowls and lavatories might be improved upon. The arrangement also of the staircases projecting into the entrance halls is unsightly, and the elevations are too ill-proportioned to be referred to. The set of designs numbered 8 is in pleasant contrast to the last, and shows considerable thought and ability. The author has boldly departed from the other schemes, and has entirely removed the bath from Seymour-place, and has placed it along the west boundary, with the ladies' swimming bath in the south-west angle behind the laundry building facing Seymour-place. This ladies' portion has a long top-lighted corridor from the entrance in Marylebone-road, and the entrance is as secluded as could be wished. The men's second-class bath, in the centre of ground floor, is not so conveniently planned as it might have been. The position of the laundry in Seymour-place appears to be the right one, though the separation of the ironing-room and laundry on different floors is not desirable. The ladies' second-class private baths are also well-arranged over the ladies' first-class baths, but with a separate entrance in Seymour-place. In some cases the water-closets would have been better grouped around areas. The elevations are a harmonious arrangement of terra-cotta and red brick suitable to its purpose and in quiet taste and good proportion. The design deserves some recognition, and we are surprised that it has not received it.

The plans numbered 6 are above the average. The author retains the swimming-bath in Seymour-

place and places the ladies' swimming-bath at the west side. The public laundry occupies the centre space of the basement. The arrangement of dressing boxes in side avenues is not the best in our opinion There are several points in the plan where improvements would be desirable, but the design shows careful preparation and the elevations are in quiet and suitable taste. No. 10 is a set of plans which retains the Pompeian bath, the elevations are good and show considerable ability, but the plans show much weakness. The irregular angles on plan are unreasonable, and there is a distinct want of simplicity about the corridors. The first floor is better in this respect than the ground floor. No. 11 differs from any formerly mentioned in planning, only one men's swimming bath under the forecourt with men's private baths behind. The ladies' swimming and men's second-class swimming baths are placed together in centre of site. The ladies' entrance is not sufficiently secluded, whilst the elevations are too florid and unsuitable to the character of the building. It is a pleasure to turn to the elevations of No. 12, which are undoubtedly the most artistic shown, presumably for execution in stone and red brick. It is disappointing to find that the excellence of the elevations is not mantained in the plans, though there are several good points, notably the central entrance, and the long straight corridor down to the Pompeian bath, which is retained. The laundry seems inaccessible on the west side of first floor. The author is irregular in placing two men's swimming baths side by side under forecourt parallel to Marylebone-road. No. 14 is distinguished by a front elevation of much lavish detail. In many respects it has beauty and is well drawn, but throughout the building the author has introduced much too elaborate detail. The plan is much too intricate for a building of this sort. No. 15 is singular in showing an inclined roadway from the Marylebone-road to the boiler-house on the west side, but this arrangement has not materially affected the plan or simplified the other arrangements. No. 16 removes the Pompeian bath and places the womens' swimming-bath next to Seymour-place. The author of No. 21 sends separate schemes shown on two plans, with similar elevations applying to either, the difference in arrangement is caused by removing or retaining the Pompeian bath. In one the Pompeian bath is placed along the west side, and the laundry in Seymour-place. The two baths are then easily reached from the Marylebone-road entrance by a short corridor. We certainly like this plan in many respects, and the elevations take a good place amongst the others. No. 9 shows a new arrangement; the ladies' swimming bath with its long axis east and west, behind the entrance to main building; the arrangement however shows no developement that leads to any great gain. As to the award, there is no doubt the first place is occupied by a competitor who submits the best plan and an indifferent elevation. As to plans 2 and 3, the latter especially, we should like to have seen the premiums taken by designs of greater merit.

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

FESTIVAL DINNER.

A FESTIVAL dinner, to celebrate the sixtieth anniversary of the first general meeting of the Institute, held on 2nd July, 1834, took place at the Whitehall Rooms, Hôtel Métropole, on Monday last. Mr. F. C. Penrose, M.A., F.R.S., F.R.A.S. (President) occupied the chair, supported by the American Ambassador, Sir F. Leighton, P.R.A., Mr. Alma Tadema, R.A., Mr. Thomas Brock, R.A., Sir James D. Linton, Mr. W. G. Orchardson, R.A., Mr. Alfred Gilbert, R.A., Mr. Alfred Waterhouse, R.A., Mr. Walter Crane, Mr. W. Bayliss, the Bishop of Ely, the Bishop of Peterborough, the Dean of Rochester, Archdeacon Farrar, the Dean of St. Paul's, Mr. Wolfe Barry, C.B., Colonel Edis, Sir F. Dixon-Hartland, M.P., Lord Kelvin, Mr. Shaw-Lefevre, M.P., Sir Walter Foster, M.P., Admiral Field, M.P., Sir Robert Rawlinson, Sir Douglas Galton, Sir John Stainer, &c., the company numbering over 200 in all.

After the usual loyal toasts, proposed by the President, the toast of "The Houses of Lords and Commons" was given by the Dean of Rochester, and responded to by the Bishop of Ely for the Lords and Mr. Shaw-Lefevre for the Commons. The latter, in the course of his remarks, said that during the existence of the Institute there had been many great architects, who had left their mark on the country. It would be an important question to discuss how, during those sixty years, additions had been made to buildings of interest to the metropolis. Never in the history of the country had there been greater opportunities, for London during that time had increased beyond all possible expectation. Many opportunities had been afforded to architects, especially on the Thames Embankment. This much he might say, that many considerable and beautiful buildings had been erected during the sixty years, and he was sorry to say there had also been an increase of buildings of an inferior character. For his own part, he believed there was even more to be done in removing and demolishing that which was ugly than in erecting that which was beautiful. He had had the good fortune to demolish the warehouses which stood in front of the Tower of London, and the building at the west front of Westminster Hall. He had also made arrangements to abolish the house which stood in front of the Abbey, and he had reason to believe that would be carried out successfully. Therefore, he thought that better results could often be obtained by carrying out a process of demolition than by erecting buildings of a somewhat doubtful character.* He hoped the Institute would continue for another sixty years, and that its members would always bear in mind three important facts, viz.—first, to conserve buildings of interest; secondly, to demolish what was useless; and, thirdly, to erect buildings which would add something of interest to this great metropolis.

The United States Ambassador (The Hon. T. F. Bayard), in proposing the toast of "Literature, Science, and Art," asked what was Art? It seemed to be a recognition that there was a perfectibility in the human capacities that should lead men the better to perceive the indestructible nature of their origin, and the purpose of their creation. In such an assembly the boundary lines between the different expressions of humanity, appealing for its liberation—conscious of its origin, and hopeful of its destiny—faded into obscurity, for there was a common purpose and a great object, that civilisation and man's elevation should be helped from every quarter, and by every votary and disciple who wrote Art upon his creed.

The Bishop of Ely responded for "Literature." Both Literature and Architecture, he said, were frankly democratic arts. They appealed to the eye of the passer-by, and it was their endeavour to elevate a man out of his own surroundings. In doing so it was natural, perhaps, for men of letters and architects alike, to begin with a desire for originality. The experience of life, however, taught them the same lesson. It taught that when a motive had once been properly expressed, there was no power of going beyond it, or amplifying it, and it drew them back to those great primary principles upon which, after all, human life was built, and which did not need to be rediscovered.

Lord Kelvin, in responding for "Science," said he must not forget that architecture was the first practical application of science. He often felt, in respect of mere dynamical science, that it was difficult to realise how their predecessors, three or four thousand years ago, succeeded in cutting out the obelisks and monoliths from the native granite, in conveying them, and getting them to stand on end. Dynamical science originated in those works, but science did not end there. They had the building of monuments, temples, cathedrals, town-halls, houses of parliament, and bridges. And what were they to say of the houses of modern London? These were full of science and engineering, with lifts and electric lighting. He would like architects to feel, more perhaps than they had felt in the past, that their beautiful art was not merely a decorative art, and an art which covered their country with beautiful objects, but rather with objects which, while they were beautiful, must also be useful. Houses, too, must not only be useful but be healthy, and science should be applied in all details in the most thorough manner. He asked them, therefore, to consider architecture, not simply as a beautiful art, but also as a magnificent application of science.

Mr. Alfred Gilbert, R.A., replied on behalf of "Art."

Sir F. Leighton, P.R.A., proposed the toast of the evening, "The Royal Institute of British Architects and the Sixteen Allied Societies." In doing so he said he fulfilled the duty, but owned to a feeling of contrition, as, though he was an honorary member of the Institute, he knew but little of its interior constitution; but perhaps his being asked to propose the toast was a sign that at the present day knowledge of a subject was not a condition which was indispensable. In appreciating this toast they had to keep before their minds the special and far-reaching power and scope of building and architecture. To painting and sculpture it was given, as to music and architecture, to transport the spirits of men into regions of pure and serene emotion, and painting and sculpture did it through the suggestive treatment of the forms and hues of animate and inanimate creation. Like music, they elevated and adorned life; like music, they had no basis in necessity, except the need, common to all men, for spiritual food. But with the art of architecture it was otherwise, for it grappled more closely with life. Its root and base were in necessity; it provided primarily for the satisfaction of material needs; and to it was given the noble and lofty faculty of transfusing into the thing of necessity the divine *afflatus* and essence of beauty. The inevitable surroundings of daily life—the roof overhead, the wall around, and the floor under foot, the buildings in which men lived, legislated, traded, or took their leisure—these could be made to yield sharpening and satisfying nutriment to the highest æsthetic instincts. To such and so great an art it was given to the Institute to minister, and might the Institute long thrive and prosper under so weighty and responsible a duty.

The toast was drunk with much enthusiasm.

Mr. J. Macvicar Anderson said he would not have ventured to respond to this toast in the presence of his revered friend, the President, but for the circumstance that Mr. Penrose had specially requested him to do so. It was sixty years since the first meeting of the Institute was held. The meeting was a small one, but the names of those who composed it were not unknown to fame. First and foremost among the names was that of Charles Barry, who he believed was the greatest English architect the century had produced. Among other names of men who attended that first meeting were those of Donaldson, Hardwick, Papworth, and others. Those were the men who convened the first meeting of what afterwards became the Royal Institute of British Architects, and who organised it. He was aware that in these days of federation, combination, and union, such a term as organisation must be received with a certain amount of suspicion. He had lived to see organisations, the first motive of which was laudable in the extreme, become not blessings but curses, and year by year he became more convinced that they would effect not the well-being, but the ruin and distress of the industries they were born to promote. It was, therefore, well to explain that the Royal Institute of British Architects was founded, and was promoted, not for the well-being of architects, but for a far higher and nobler purpose—that which every true architect desired—viz., the promotion of architecture. How important this was all would recognise. If they possessed pictures or groups of sculpture which, from change of taste or fortune, they ceased to take an interest in, the convenient rooms of Christies would relieve them of these. If they ceased to admire those works of music with which they once were charmed, they need not listen to them. Or, in the case of literature, if works which once were favourites had ceased to be so, they need not read them. But with architecture it was different. When the idea of the architect was once crystallised in enduring and material form, it remained from year to year, and from generation to generation, creating emotions in the eyes of the beholders either of hope and gladness, or of depression and despair. How important, then, that everything should be done to promote the best interests of architecture. He might be asked what the Institute had done to promote that object. He could speak volumes on the subject, but he might be permitted to refer to a few points which justified its existence. He observed in the first address presented to the Institute that the most important consideration was the formation of a library. Were it possible for any of the original founders to look in at Conduit-street, they would surely admit that their intention had been carried out, and that a library had been formed, which was second to none in point of interest and of value to the architectural student. The founders further desired that the members should meet and publish their proceedings, and it would be admitted that these were now conducted in such a manner as to convey to the public the information they ought to possess in relation to the art of architecture. Then, with regard to the great subject of education, their views in that respect had

* It is a pity that Mr. Shaw-Lefevre, during his period of office as First Commissioner of Works, did not act on this principle himself.—ED.

been so recognized that, in the report of the Royal Commission on a Teaching University for London, it was recommended that one seat on the Senate should be given to a representative of the Institute. There were also prizes, the bursaries, and the travelling studentships of great value, which the Institute offered, to promote the rising talents of young architects; and he would refer lastly to the gift of Her Majesty, who every year permitted them to recommend an architect, or a man of science and literature connected with architecture, who had carried out some work of such importance as to justify his receiving the Royal Gold Medal. It was the glory of this medal that it was not confined to English architects. Only a few days before, the President of the Institute presented it to one whom they gladly recognised in this country as the typical representative of the fine arts, the accomplished President of the Royal Academy. He had ventured to show briefly that the Institute had realised the intentions of its founders, but there was still one point he must refer to—one condition which, through no fault of theirs, had not been fulfilled. Government after Government had succeeded during the sixty-six years of their existence, but had not supplied them with a place where they could hold their meetings, and deposit their collections. Their resources could be applied with increased advantage and greater force to the promotion of architecture, if an enlightened Government had seen its way to assist the Institute. In the name of the Royal Institute of British Architects and its allied societies he expressed to Sir Frederick Leighton their grateful acknowledgments of the graceful and kind way in which he had proposed the toast.

Mr. A. Waterhouse, R.A., proposed the toast of "The Visitors," which was responded to by Sir John Stainer, and the proceedings terminated.

INCORPORATED ASSOCIATION OF MUNICIPAL ENGINEERS.

THE twenty-first annual meeting of this Association was held in the Lecture-room of the Institution of Civil Engineers, Great George-street, Westminster, on the 21st ult. Last week we gave the greater part of the address of the President, Mr. A. M. Fowler, C.E., and we now return to the further proceedings of the Association.

Mr. T. Codrington read a paper "On some experiments with Model Wheels and Road Coatings," and after a short discussion,

Colonel Jones, V.C., read a paper on "The Development of Sanitation in America."

The problem of sewage disposal had, he said, been taken up by Americans in a much more theoretically scientific manner, and been less complicated by rival patentees than in England, where the public were always expecting that electricity or magic would some day conjure away our sewage difficulty. "The American engineers studied all that has been done in Europe, and satisfied themselves, as we have done, that whenever purification is demanded by local conditions it can only be obtained by intermittent filtration through land or its equivalent in a sand filter; but they could not help observing numerous imperfections in our practice, in pursuance of absolutely sound principles, and had to consider certain limitations to their application in their own country. For instance, there are four important factors in the American problem, viz:—(*a*) Colder climate; (*b*) Dilution of sewage—the water supply of American towns averaging eighty or more gallons per head of their population; (*c*) High wages for common labour; (*d*) The rapid rate of increase of population in the large towns; which all received very careful consideration. As regards *a*, it may be noted that opponents of irrigation schemes in England often exaggerate the difficulty of dealing with sewage by that means in frosty weather, although it has been proved again and again that sewage never reaches the land much lower in temperature than 45 deg. F., and with reasonable care can be passed through a large area of land under cover of ice and snow during the hardest and longest frosts of our climate. But knowing that winters are much more severe in many parts of the United States it was desirable to examine very carefully what could be done, and as a result the American authorities have determined that it would not be desirable to resort to land treatment in districts where the *monthly mean temperature* falls below 20 deg. F. The author trusts, therefore, that English people will realise what a monthly mean of 20 deg. F. means, and never again support anything so absurd as the frost objection regarding sewage farming in this country. The special conditions *b*, *c*, and *d* must govern the question in America, just as the high price of land does in England, and there is a general disposition to ask, "How little land can we do with?" although it is well known that under reasonable conditions both sanitary and financial requirements can be best satisfied by the devotion of a large area to sewage disposal in the way of broad irrigation . . . . The Massachusetts State Board of Health began in January, 1888, and are continuing to the present time, a most interesting course of extended laboratory experiments (with artificially-prepared filters up to 17 feet diameter, 6 feet deep), which has clearly elucidated the chemical and biological process which takes place while sewage is percolating through the pores of sand or soil, a process which we used to call oxidation, from its effect only, leaving the cause undetermined, though its source was recognised as air in the soil. And the carefully-kept records by these experiments amplify and confirm in the most satisfactory manner the earlier discoveries by Dr. Sorby, Warington and Percy Frankland, of nitrifying organisms working both in land and water. They have proved that intermittent filtration through sand or soil is not a process of straining at all, but is, on the contrary, a biological process in which the nitrifying organism, with the assistance of oxygen from the air and minerals naturally in solution in the sewage, resolves the organic matter of the sewage into soluble nitrates, and that as much as 100,000 gallons a day per acre may be passed through coarse mortar sand with the result of removing 98 per cent. of the albuminoid ammonia originally present in the sewage. The question of permanency of the filters, even with dilute American sewage, remains an open one, for the Report for 1892 refers to clogging, not only on the surface, which can be easily picked up, but in the body of the filter itself, and suggests caution in practical application of a table of quantities of sewage per day per acre, which had been put forward in the previous year's official Report. The clogging in lower parts of the filter is, however, attributed to the fact that the sand had been shovelled into the filter-bed while the latter was filled with water, and thus become stratified by the finer sand falling later than the coarser part of the material at the intervals of the filling operation. The layers of fine sand have intercepted particles of sewage which had passed through the coarser sand above, and thus become impervious, and it has been found that capillary attraction retains water in the lower part of a layer of fine sand which rests upon coarser material, and thus forms a water seal to prevent aëration of that part of the filter which lies below that stratum. The hope is expressed that stratification can be avoided in practice, and that with more moderate doses of sewage than those applied to the experimental filters, there may be less descent of particles below the surface, thus prolonging the life of filters in practical use . . . . Parallel with the filtration experiments above referred to another series has been devoted to chemical precipitation and simple deposition or "sedimentation," and results with lime, copperas, sulphate of alumina, separately and in combinations, are carefully recorded in many pages of the reports. But the total purification (indicated by the percentage of albuminoid ammonia in the raw sewage removed) in the best cases failed to reach 60 per cent., as compared with 98 per cent. removed by properly-conducted filtration through sand in the other series. Our judgment of practical trials has led us to much the same conclusion in this country, but we have never had access to records of such extent and authority as are supplied by the State of Massachusetts. It is beyond the scope of this paper to convey these data, but it is intended to urge a study of the original Reports and of a great work on "Sewage Disposal," by Messrs. Rafter & Baker, published by Van Nostrand, New York, and Sampson Low, Marston, & Co., London, 1894. This work, although compiled in America especially, will be found valuable to young engineers and sanitarians everywhere as a complete and reliable digest of the voluminous English blue-books and papers on sewage disposal which have been the study of a lifetime to engineers of the last generation, and it gives the latest American investigations all in one large volume."

Mr. Cooper (Wimbledon) considered it unfortunate that the filters spoken of by Colonel Jones were only experimental filters, not filters constructed in the best possible manner. The capillary attraction at the bottom of the filter prevented that portion being aërated. Had larger stones been used and proper drainage that capillary attraction would have been got rid of and the air admitted to the bottom of the filter, which would lengthen its life. He did not believe in soil, and the growing of crops on the filter, as the soil very materially affected the amount of sewage which could pass through the filter.

Mr. White (Oxford) said the paper had very adroitly raised the whole question of sewage purification and utilisation. Colonel Jones had been very severe upon the chemical processes of sewage disposal, but as a strong advocate of irrigation he (Mr. White) was not disposed to quarrel with him on that account. He proposed a vote of thanks to Colonel Jones for his paper.

Mr. Hodson (Loughborough), who seconded the vote of thanks, said the great bugbear of sewage disposal was summed up by Colonel Jones in the words, "How little land can we do with?" That to his mind had caused more trouble and difficulty in connexion with sewage disposal than anything else. There were, of course, districts where but little land could be obtained, and where of necessity they must adopt chemical treatment; but wherever it was possible he was bound to say he was a strong adherent for treating sewage on land.

Mr. Mawbey (Leicester) said that their experience at Leicester had proved that the chemical system was absolutely out of the question. Up to three or four years ago the river was an abominable source of pollution, although they had tried every known chemical process. He had come to the conclusion from his experience at Leicester, that for final treatment of sewage there was nothing to equal land.

Mr. Escott (Halifax) said he agreed with land filtration where land could be obtained, but where land could not be obtained he believed that chemical treatment would turn out as bright an effluent, and at less cost.

Mr. Pritchard (Birmingham) while generally expressing himself in favour of land treatment, said that every town must be governed and controlled by its own local conditions.

Mr. Lemon (London) said he thoroughly agreed with what Colonel Jones had said respecting rival patentees. He congratulated American engineers that they were less troubled by rival patentees than engineers were in England. He agreed with Mr. Pritchard that they must adapt their systems to local circumstances. He was very sorry they should have a discussion on the relative merits of land filtration or chemical treatment. They were both right in their spheres. There were cases where it was absolutely impossible to obtain sufficient land for complete purification.

The President having briefly referred to the difficulties of Salford, and the system adopted at Manchester, said that engineers must adapt themselves to local circumstances in preparing schemes for sewage disposal.

The vote of thanks having been adopted,

Colonel Jones, in reply, said he quite agreed with the principle that particular rules could not be laid down for every place, but that each place must have its conditions attended to by the engineer recommending the scheme.

Mr. R. B. Sanders, King's County, then read a paper on "Irish County Surveyors."

A vote of thanks having been accorded, Mr. Sanders briefly replied.

Messrs. Parker, of Hereford, and Thomas, of Buckingham, were appointed auditors; and Messrs. Radford (Putney), Silcock (King's Lynn), and Pickering (Nuneaton), scrutineers. The various honorary district secretaries were unanimously re-elected.

The meeting then adjourned, and in the evening the annual dinner of the Association, a report of which we gave last week, was held.

The meeting of the Association was resumed at the Institution of Civil Engineers, Westminster, on the 22nd ult., Mr. A. M. Fowler presiding.

The Secretary (Mr. T. Cole) read a paper written by Mr. Laws, Newcastle, on arrangements for sterilizing cholera dejecta.

On the motion of Mr. Stainthorpe (Eston, Yorks) seconded by Mr. Mann (Sevenoaks) a vote of thanks was accorded to Mr. Laws for his paper, and it was agreed to discuss it at the first district meeting in the Northern Counties.

Mr. Swindlehurst (Burton), read a paper on "Maintenance of Main Roads in Urban Districts," from which we take the following extracts:—'It is scarcely possible within the limits of this paper to enter into the question as to what may be considered reasonable expenditure on urban roads under the various heads named. The subject is

much too wide and important to be dealt with briefly, and would demand separate consideration, for it is fully recognised that it is misleading and unsafe to dogmatise on matters of this kind. There are, however, two or three further points which it may be well to mention. *Footpaths.*—First in respect to footpaths. In several counties it is still the practice of the County Councils to altogether repudiate liability in respect to expenditure on footpaths. This fact is merely mentioned, as the question is purely a legal one, the law as it at present stands being clearly against this contention. Hence the Local Government Board awards allow expenditure in respect to footpaths. *Improvements.*—Another important matter which more or less affects most urban authorities is the question of "reasonable improvements." This appears to be a particularly vexed question. By the term "improvements" the writer understands works which do not come within the ordinary term "maintenance and repair," as, for instance, alterations to the structure of the road surface, or any alteration in respect to the level or width of roadways or footpaths, the substitution of one class of paving for another, and works of a similar nature. It has evidently been the practice of the Local Government Board to award local authorities one-half the cost of "improvements," and in view of this fact the recent decision as to the rights of local authorities in respect to main roads assumes a very important aspect. The case referred to is that of *ex parte* the County Council of Wiltshire, and it was decided on January 26, 1894, by the Lord Chief Justice and Mr. Justice Day. It decided, in fact, that "the obligation of the County Council under Section 11—(2) and (3), is to repay to the Borough the actual cost (assuming it to be reasonably and properly incurred) of the maintenance, repair, and reasonable improvement of main roads during any year, whether such cost be normal or increased by reasonable improvements connected with maintenance and repair, and whether it be defrayed by the Borough out of current rates or by means of a loan." What effect this decision will have on future awards remains to be seen. *Management.*—A further point affecting the maintenance of main roads by urban authorities, and one which it is important to consider, as it frequently arises is the question of the *management* of the roads. Some people tell us that the only method of working main roads which can be satisfactory to the County Council is for the local authority to keep a separate and distinct staff of men and teams, with separate tools, plant, &c., for service *only* on the main roads, and it is insisted that unless this is done it is not possible for the local authorities to properly keep the expenditure on the main roads as distinct from other district roads. Now what would be the effect of this? It means that everything in connexion with the main roads must be kept for main road purposes simply. This system may be all very well on the rural roads, but for urban roads, often heavily trafficked, and passing through a busy town, it is very different. Many authorities have only a comparatively short length of main roads, and to carry out this system would entail much greater expense. Mr. Howard Smith, A.M.Inst.C.E., the City Surveyor of Carlisle, has recently issued a valuable tabulated statement of replies from eighty-one non-county boroughs where main roads exist. From this statement we find that gangs of scavengers are engaged *solely* on main roads in eight only of these places, whilst three only keep watering-vans *solely* for use on main roads. It will be seen from this that the almost universal practice is opposed to the keeping of a separate staff for main roads. The writer has the management of the whole of the roads within the borough of Burton-upon-Trent, the largest non-county borough in Staffordshire. There are 8·76 miles of main roads, and 29·87 miles of other district roads within the borough. It was found necessary to appeal to arbitration in respect to the main road claim for the year ending 1891. As a result of this appeal the local authority was awarded 92 per cent. of the total amended claim, 99 per cent of the claim originally rendered to the county, and which the authority was prepared to accept. Unfortunately it is found necessary to again appeal for two other years' expenditure, and this we are sorry to say seems to be the lot of at least seven other non-county boroughs of Staffordshire. The main roads in Burton are maintained by the same staff of men, and the same plant, &c., is used as on the other roads. The system is as follows:—The borough is divided into districts: a road foreman has charge of the men engaged in a particular district. The workman *each night* gives to the foreman particulars of the time he has made, and where and how he has been employed; the foreman makes out a time-sheet *daily*, showing this information in respect to each labourer and team employed, and also what material has been used and for what purpose. Separate spaces are provided on the sheet, in which are entered in their proper columns the time and material expended on each main road. These sheets are inspected by the writer each morning, and then handed on to the wages and stock clerk, and after being checked and monied out by the clerk having charge of the main roads accounts, are entered in great detail in the main roads ledger, each class of work being kept in a separate column. The actual time made and material used on each main road is thus carefully kept each day, and the cost of the roads clearly shown day by day in the ledger kept for the purpose. This is mentioned thus fully to show the care which is taken to get a perfectly true and faithful record of the main road expenditure. In fact, the course adopted is to so conduct the whole operation of main road management in the district, not only in respect to the carrying out of the work, but also as to the supervision, the keeping of the accounts, and the preparation of the claim, always having in view the possibility of dispute, and recognising that the whole matter may have to be thrashed out before an impartial and severe critic. This will be found at once a safe and satisfactory method, and wherever it is adopted there need be little said as to the keeping of a separate staff on main roads.'

Mr. Robinson (Hampshire), proposed a vote of thanks to Mr. Swindlehurst for his paper. Whatever the reason which had influenced the Legislature, the result had been that the counties had to provide the means for the maintenance of urban main roads. The county authorities had to consider the interest of their county ratepayers, and therefore must examine most critically the claims submitted to them by the urban authorities. To show how necessary this was, he mentioned that in Hampshire the expenditure on urban roads had been doubled since the passing of the Local Government Act.

Mr. Lobley (Hanley), who spoke from an independent position, as the representative of a county borough, suggested that the present arrangements should be altered, and that the contribution from the county to the local authority should be the proportion of the county rate that the ratepayers in the urban district paid.

Mr. Davis, County Surveyor of Shropshire, believed that agreements might be largely effected by an interchange of views between county and urban surveyors.

Mr. Lowe (Hampstead) mentioned that for two disturnpiked roads for which the Hampstead Vestry offered to accept 1,900*l.* a year the sum of 2,137*l.* was awarded on arbitration.

Mr. Codrington, Local Government Board Inspector, said that if authorities would agree to the suggestion of Mr. Lobley, it would be a very good basis to work upon.

Mr. Weaver (Kensington) expressed the opinion that the grants to local authorities should be made on the basis of country roads, and not of town streets.

Mr. Hodson (Loughborough) considered that the position of this question had been entirely changed by the recent Parish Councils Act. He thought each district should have the maintenance of its own roads, and the grant in aid allotted every four or five years by arbitration on their ratable value.

Mr. Ruck (Kent) stated that the cost of roads in his county was 407*l.* a mile.

The vote of thanks having been accorded, Mr. Swindlehurst briefly responded.

Mr. Shoolbred (London) read a paper giving the results of four years' working of the Corporation electricity supply at Bradford. The whole of the working costs and sinking fund charges had been met, and a profit exceeding 2,000*l.* paid over to the aid of the rates.

Mr. R. Hammond (London) read a paper on "Electrical Traction."

Mr. Crompton (London) congratulated Mr. Shoolbred on the successful working of the Bradford system, which he attributed to the adoption of the low-pressure continuous system.

Mr. R. Hammond said the object of his paper was to show that there was a power in electricity works which could be usefully and profitably used for electric traction.

A vote of thanks accorded to the authors for their papers, and a vote of thanks to the Institution of Civil Engineers for the use of their rooms, closed the business portion of the proceedings.

The members then proceeded to the Mansion House, where they were received and entertained by the Lord Mayor. His Lordship, in welcoming the members, expressed his sense of the great work in sanitation performed by Municipal Engineers. From the Mansion House the members proceeded to the Limmer Asphalte Works, where they were shown the process of manufacture.

Rock asphalte, it was stated, is a natural product—a limestone rock impregnated with bitumen—and is found in Limmer and Vorwohle in Germany, in Switzerland, France, and Sicily. For compressed work this company's supplies are taken from Ragusa in Sicily, and for mastic work from Germany. It is quarried in the same manner as other minerals, and brought to England in its natural state. The process of manufacture of compressed asphalte for carriageways, &c., is as follows:—The pieces of raw rock, weighing from ¼ to ½ cwt., are placed into the "crusher," where they get broken to the size of walnuts. After passing through the crusher the asphalte is carried up by elevators to the disintegrator, which runs at a speed of 1,800 revolutions to the minute, where it is ground to a fine powder. For compressed work this powder is heated in roasters with revolving cylinders to a temperature of about 280 deg. Fah., and as soon as the superfluous moisture has evaporated the heated powder is placed in iron sheathed vans, covered with cloths and taken to the street where it is to be laid. The powder is then raked over the surface of the street to the thickness required and rammed with hot pelons, smoothed to a polished surface and then rolled with a heavy hand-roller. It gradually becomes cold, and in time is compressed into solid rock again by the traffic. The usual thicknesses of compressed asphalte are as follows:—

Carriageways (heavy traffic) ... 2 in.
,, (light ,,) ... 1½ ,,
Laid on a bed of 6 in. of Portland cement concrete.

Footways ... ... 1 in.
On a bed of 3 in. to 4 in. of Portland cement concrete.

Mastic asphalte is manufactured in the same way as the compressed as far as the powder stage, then it is boiled in cauldrons worked by agitators with a certain quantity of bitumen as flux, and when heated to about 400 deg. Fah. a proportion of from 10 to 20 per cent. of fine Bridport grit is added, and thoroughly incorporated with the asphalte by the agitators, it is then turned into iron moulds and made into cakes of ½ cwt. each ready to be sent to any part of the world. These cakes are broken up, put into cauldrons with just sufficient bitumen as a flux, and when properly cooked the asphalte is spread over the surface to be covered by means of hand floats, and then rubbed with fine sand.

A visit to the Australian meat stores of Messrs. Nelson Bros., Limited, at Lambeth, closed the day's visits.

On the 23rd ult. the members had a river trip on a steamer kindly provided by the President (Mr. Fowler), proceeding from the Temple Pier to Richmond, where they inspected the new footbridge and weir, and then proceeding to the sewage works at Teddington, where the process of sewage disposal was explained by Mr. York, the local Engineer.

THE LONDON COUNTY COUNCIL AND FREE LABOUR.—A deputation of representatives of the National Free Labour Association waited upon the Works Committee of the London County Council on the 25th ult. respecting the employment of non-union labour by the Council. The object of the deputation, whose views were stated by Messrs. W. Collison, secretary, and F. J. Rogers, treasurer of the association, was to combat the statement that the Council does not display partiality in the employment of labour. A number of witnesses were brought to prove to the committee that they had been refused employment during the last eighteen months because they did not possess the Building Trades' Federation ticket. The result was that, having heard the statements, the Committee promised to make every inquiry into the matter, and to thoroughly investigate it.

RUTTY'S ROAD SCARIFIER.—This machine for breaking up Macadam roads, previously to relaying, which we noticed and described some little time ago, has just been successfully tried at West Hampstead. The scarifier is drawn in the train of a traction engine or steam roller.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Sir John Hutton occupying the chair.

A New Asylum.—The Asylums Committee reported that the purchase of the portion of Baldwyn's Estate, Bexley, Kent, as a site for a new asylum, was completed on April 10 last. They now proposed, in accordance with the powers conferred on them by Section 254 of the Lunacy Act, 1890, subject to the Council authorising them, under Section 239, to provide the asylum, to obtain, by public advertisement, plans and estimates for the erection of an asylum for 2,000 patients, and to duly submit for the approval of the Council the design selected. Certain preliminary expenditure would have to be incurred for obtaining plans, advertising, printing, and other incidentals. They accordingly recommended—"That, in accordance with section 239 of the Lunacy Act, 1890, we be now authorised to provide the sixth asylum, and, subject to the usual estimate being submitted to the Council by the Finance Committee, to incur a preliminary expenditure of 2,000*l.*"

Mr. M'Dougall proposed as an amendment the addition of the following words to the recommendation:—"And that it be an instruction to the Asylums Committee that the cost (exclusive of site and furnishing), must not exceed 350,000*l.*, and that they do engage an architect, to be paid by salary, and the necessary assistants, to prepare the plans and supervise the erection of the proposed asylum."

Mr. Beachcroft seconded the amendment.

Mr. Strong, the Chairman of the Committee, said that Mr. McDougall's idea of engaging the services of a clever young man, and of giving him instructions what to do, was an idea which would be attended with some risk and danger. The Committee had decided that in the event of the resolution being agreed to premiums of 300*l.*, 200*l.*, and 100*l.* should be paid to the first three architects respectively so placed by an assessor, but that the assessor should not be appointed until after the plans had been sent in, in order to insure against competing architects designing in accordance with views known to be possessed by the assessor. They also proposed, instead of giving the usual commission to the successful architect, to set aside the sum of 10,000*l.* for architects' work in connexion with the asylum. That sum would include everything except quantities.

Mr. Nathan Robinson supported the recommendation of the Committee, and regretted that Mr. McDougall had, after being defeated in Committee, thought fit to move his amendment.

Mr. Roberts said that there were only one or two possible assessors in the matter of lunatic asylums, and the result was that a competition for such a building was confined to a select ring of specialists. He advocated the proposed departure, which was not new, for the London School Board, after trying the competitive system, had adoped a similar arrangement. The Council already had its own architect and engineer, and they ought to have an architect for their asylums.

Dr. Cooper, in supporting the amendment, said he regretted that the Committee should have gone in the face of medical opinion in asking the Council to erect an asylum for 2,000 people. The Lunacy Commissioners were totally opposed to such huge asylums, for it was impossible to properly treat the disease from a medical point of view where the patients were congregated together in such large numbers.

Mr. Emden heartily supported the recommendation of the Committee, and said that when they were spending 300,000*l.* or 400,000*l.* it was absolutely necessary that they should have the best advice that they could possibly obtain, and employ the most experienced man they could find.

Mr. Westacott thought the committee should take the report back and bring up a fresh one, in which they should say definitely whether they thought the asylum should be built on the "block" or the "villa" system.

On a show of hands, the amendment was carried by 31 votes to 24, and upon a division there were—for the amendment, 57; against, 35.

Mr. P. M. Martineau then moved to omit all the words after "do engage an," and substitute the following: "experienced architect, to prepare plans and supervise the erection of the proposed asylum, who shall be paid for his services by a fee, and that it be referred to the Committee to consider whether 10,000*l.* would not be a proper fee."

Mr. Antrobus seconded the amendment, which, on a show of hands, was negatived.

Mr. Campbell moved to refer the matter back. He quite sympathised with the desire the Council had shown to alter the present "block" system of dealing with lunatics, and he therefore thought it desirable that the matter should be thoroughly reconsidered.

Mr. Lloyd seconded the reference back, which was defeated.

Mr. Pearce moved that "300,000*l.*" be substituted for "350,000*l.*" in the words introduced on the motion of Mr. McDougall.

This substitution was approved, and the recommendation, as amended, was then adopted in a substantive form.

Regent's Canal.—The Public Health and Housing Committee in regard to the Regent's and Grand Junction Canals reported that they had addressed a communication to the sanitary authorities through whose districts the Regent's and Grand Junction Canals passed, enquiring what action had been taken since the conference in December last, whether any mud deposits had been removed from the canals, and whether the surface of the water was periodically or regularly scavenged. They had also asked the Vestries of St. Marylebone and St. Pancras what steps had been taken for diverting the drainage of the Zoological Gardens from the Regent's Canal.

Mr. Lloyd regretted that the Committee had not taken more effective action, and moved that the paragraph be not received.

Dr. Collins seconded the motion, which was agreed to.

Proposed Purchase of the Water Companies.—The Water Committee reported as follows:—

"We submitted at the last meeting two resolutions with regard to the introduction of a Bill or Bills for the transfer to the Council on the lines of the resolution of the Council of February 27, 1894, of the undertakings of the Metropolitan Water Companies, or of such one or more of them as the Council might hereafter determine, and for the preparation of such Bill or Bills by the Water Committee, in conjunction with the Parliamentary Committee. Since the report was agreed to we have had the opportunity of further considering the subject, and we have come to the conclusion that it will be better to go to Parliament for powers to acquire the properties of all the companies, but to proceed by means of a separate Bill for each company. With regard to the mode of preparing the Bills it is clear, having regard to the terms of the Council's reference to the Parliamentary Committee, that, instead of authorising us to prepare the Bill or Bills, it will be the proper course to associate a few of our members with the Parliamentary Committee in the matter. This course was adopted last year in regard to the London Streets and Buildings Bill, and we accordingly recommend—(*a*) That eight separate Bills be prepared for the acquisition by the Council of the undertakings of the eight Metropolitan Water Companies; (*b*) That it be an instruction to the Parliamentary Committee, in conjunction with three members of the Water Committee, to prepare the Bills, with a view to their introduction in the next Session of Parliament."

The recommendations were agreed to, and the Council adjourned shortly after half-past seven.

OLYMPIC MUSIC HALL.—By an order of Mr. Justice Stirling in the cause Wilmot *v.* Olympic Music Hall and others, the sale by auction of this property was fixed for the 29th ulto. It is held on lease for a term of fifty-five and a half years still unexpired at an annual rent rising to a maximum of 3,000*l.*, and, covering a total area of 14,000 ft. superficial, comprises an auditorium with room for 3,000 persons, and a stage which is claimed to be, in size, second to only that of Drury-lane playhouse. A company of proprietors was formed in March of last year to convert into a music-hall the New Olympic Theatre, built four years ago by Messrs. Holliday & Greenwood, after the designs and plans of Messrs Crewe & Sprague, of Fitzalan House, Arundel-street, W.C., who made also some further alterations, with re-decoration, &c., last autumn, for which Messrs. George Veale & Co.'s contract of 2,350*l.* had been accepted. For an account of the new house see the *Builder* of December 13, 1890; and a notice of the old theatre's history in our columns of July 13, 1889.

PROJECTED TUNNEL UNDER THE GREAT BELT.—Danish engineers are completing plans of a project for the construction of a tunnel under the Great Belt and a bridge over the Little Belt, whereby direct communication would be established between Copenhagen and the rest of the Continent all the year round. The tunnel would also be of great advantage to Sweden and Norway. The estimated length of the tunnel is eighteen kilomètres, and the soil is said to offer no engineering difficulties. The cost of the tunnel is estimated at 1,112,000*l.*, and that of the bridge at 700,000*l.*

Illustrations.

DESIGN FOR A FRIEZE.

THIS design, by Mr. Arthur Gwatkin, forms the largest exhibit in the Architectural Room at the Royal Academy. The leading colours in the original are brown, olive, and purple, blending, however, into intermediate tints which cannot be precisely defined.

The forms employed are based on the foliage of the fig-tree, and the lines are intentionally designed on the basis of the square or "key" form, not on that of the scroll.

The frame was specially designed by Mr. Pite.

RIEVAULX ABBEY, YORKSHIRE.*

ALTHOUGH Rievaulx Abbey† cannot compare with Fountains in the extent and preservation of its remains, or with Kirkstall, Tintern, and other monasteries, in the ease with which its remains may be studied, it certainly carries off the palm for the extreme beauty of its situation and surroundings. Most completely, too, does it conform to the Cistercian rule that the houses of the Order were to be *in locis a conversatione hominum semotis*, for even now, with the exception of a few later cottages, the nearest place to it is the little market town of Helmsley, three miles away.

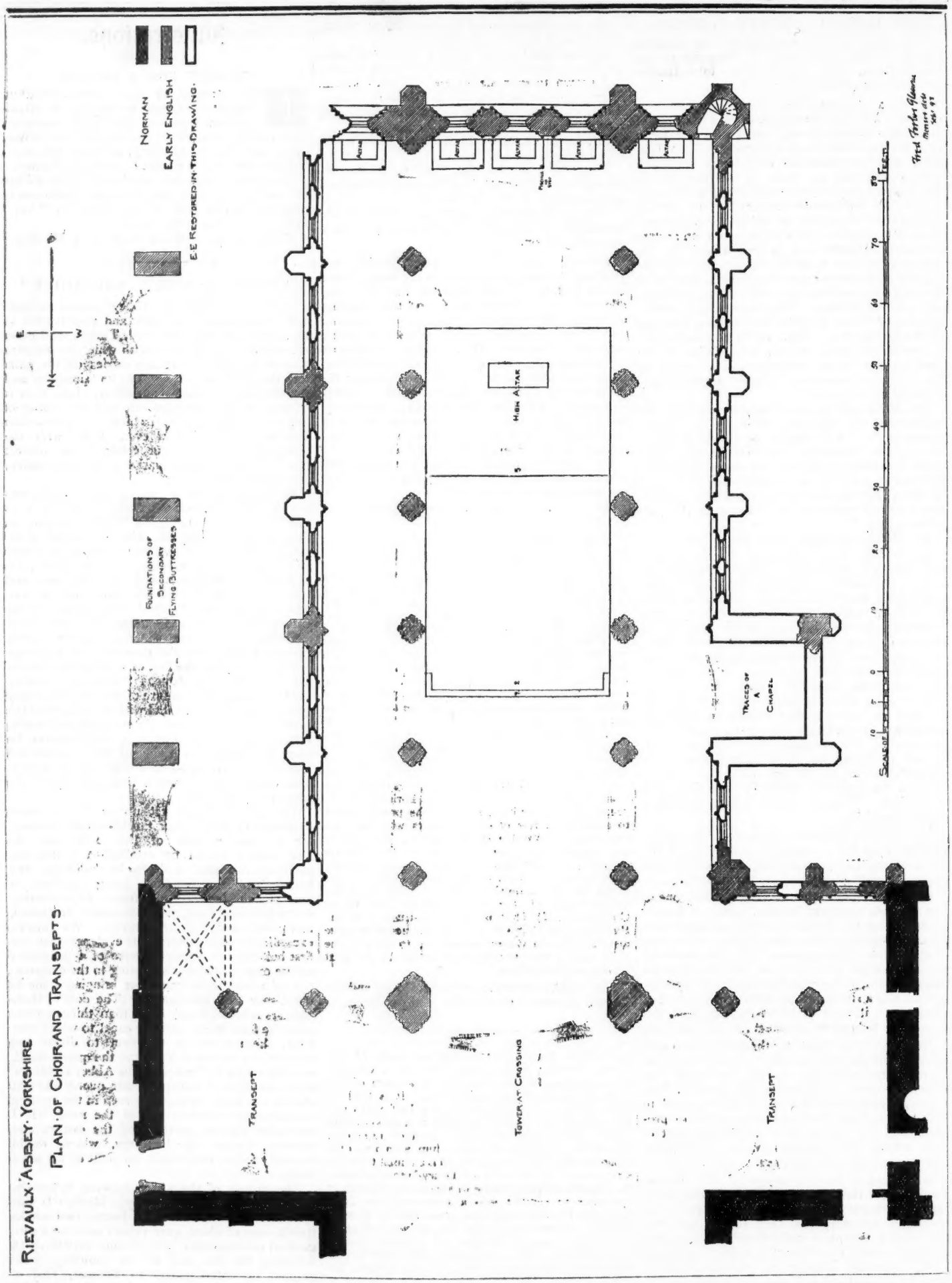
According to the popular story, Rievaulx was founded in 1131, as well as Kirkham in 1122 and Wardon in 1136, by Walter Espec, in memory of his only son, who was killed when riding. That the Abbey was founded by Espec about 1131 is true enough, but the foundation charter says nothing about his only son, and there is no proof that he ever had a son. The Abbey was founded for monks of the Cistercian Order, and colonised direct from Clairvaux. The site is in a narrow valley, through which flows the river Rye, on a plateau of high ground at the foot of a steep hill, on the top of which is the famous "Terrace." Owing to the circumscribed nature of the site, the abbey church was placed parallel with the hill, with the result that its axis lies almost north and south, instead of east and west. It will, however, be more convenient to speak of the conventional points of the compass in describing the Abbey. The cloister and monastic buildings lay to the south of the church.

The first buildings set up on the site were doubtless of wood, after the Cistercian manner, for it was a rule of the Order that no new colony should be established "until the place be furnished with books, buildings, and necessaries," the buildings being specified as the church (*oratorium*), frater (*refectorium*), dorter (*dormitorium*), guest house (*cella hospitûm*), and porter's lodge (*cella portarii*). We have an exceedingly curious piece of evidence that the first buildings at Rievaulx were of a temporary nature only, in the deeds relating to the construction of a *guteria*, or canal, for bringing stone to the Abbey from the quarry. The date of these charters is about 1,145, more than thirteen years after the foundation, and the canal to which they refer, the remains of the dam to divert and regulate the waters of Rye, and the quarry itself, are still visible to the west of the Abbey buildings. With the stone of this particular quarry the first church was built, as may be seen in the existing transepts and what is left of the nave. If I remember rightly, portions of the eastern and western ranges of buildings, which would naturally follow the church, are built of the same stone.

The history of the Abbey between its foundation and its fall is practically a blank. It was surrendered by the abbot and twenty-two monks (twenty-one of whom were priests and one a subdeacon) on December 3, 1538, and on March 18 following the site and all the buildings were granted by letters patent to Thomas, Earl of Rutland. The clear annual value at the surrender was 278*l.*, or about 5,500*l.* of our money. From a survey of the buildings, made probably under the Earl's direction and preserved at Belvoir, we

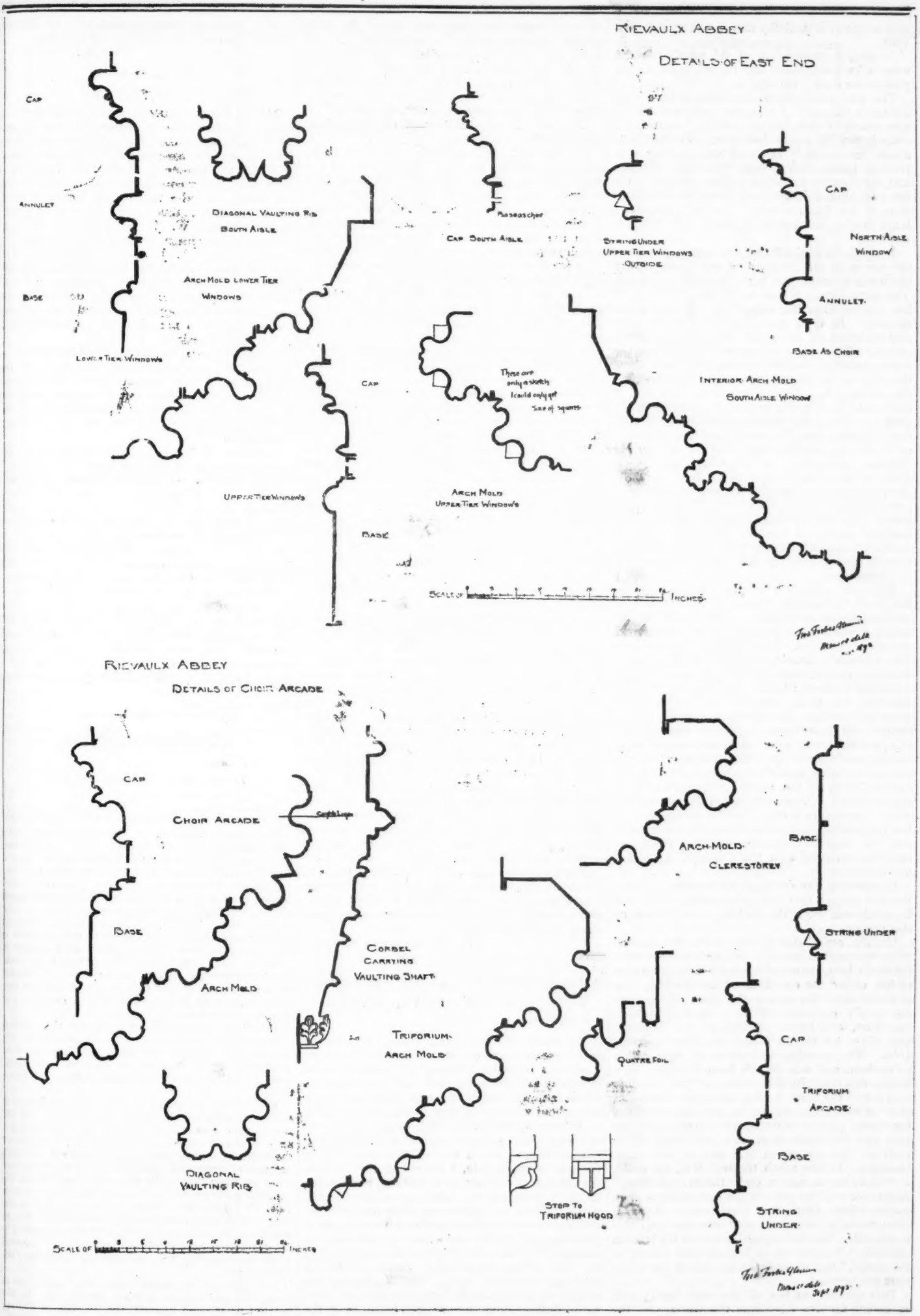
* The series of the "Abbeys of Great Britain" is resumed this month with illustrations of (No. II.) "Rievaulx." (No. I.) "Westminster" was given in our New Year' number, January 6, 1894. Particulars of this and of the three Cathedral series ("England and Wales," "Scotland," and "Ireland") will be found on p. 1 of wrapper.

† We much regret that, owing to an accident at the lithographers, for which no one was to blame, we are unable to give the view of the remains of Rievaulx, which should have been published in this issue. It will be given in the number for August 4, along with the illustrations of Glastonbury to be published in that number.



learn much valuable information as to their condition, their furniture, and the uses to which they were put. These particulars will be more conveniently discussed with the account of the buildings.

Although nothing else is left of the first church than the ends and west sides of the transepts, and part of the south wall of the ruined nave, its plan and arrangements can easily be made out. The eastern sides of the transept and the presbytery have been rebuilt, but there is little doubt that their plan resembled that of Kirkstall, an aisleless presbytery of two bays, flanked by three chapels on each side, opening out of the transept and separated by walls. The nave was nine bays long. The monks' choir occupied the crossing and, perhaps, two bays of the nave, and a third bay formed the retro-choir. The rest of the nave was the choir of the *conversi*, or working brothers. The aisles were shut off by continuous walls, against which the stalls of the *conversi* stood; but long before the suppression the *conversi* had died out, their choir had been cleared away, and the aisles cut up into chapels, four on the north and two on the south side. The fortunate incorporation of much of the old work when the transepts were rebuilt enables us to see that the architecture was of the severest possible type, with the plainest of round-headed windows and the simplest of string-courses, as in the corresponding work at Fountains. The nave, perhaps, retained its Norman character to the end, for the Survey speaks of the "selyng of the roof painted" (perhaps like that at Peterborough), and of a clearstory of "xviii. lights of square stone." The west window seems to have been one of many lights, probably a Perpendicular insertion, for the Survey directs the stone, iron, and glass "to be taken down safely . . . and to be bestowed in Helmsley Castell, and the charge of takyng down thereof is iij li. xiiis. iiijd." At the west end of the nave was a porch or Gallee, extending the width of the front, as at Fountains and Byland, described in the Survey as "the house or portche at the west end of the Church."



The Survey tells us that the chapels in the aisles were screened off by parcloses; it also specifies the images and decorations of the altars.

Whether from an increase in numbers and want of more room, or, as is more probable, from a wish to possess a finer church than their neighbours at Byland, the monks of Rievaulx began at the end of the twelfth century to enlarge and rebuild their church. The approximate date is fixed in a most interesting way by grants of land through which might be made a second *guteria* or canal for bringing stone from the quarry. This quarry, which yields a stone different in colour and quality from that used in the Norman work, was granted to the Abbey about 1160. It lies more than double the distance of the other from the Abbey, and in the opposite direction. The grants of the land for the canal, though undated, can be shown from the witnesses to have been made between 1193 and 1203, and the work itself, from its character, was clearly begun about the same time.

In place of the old aisleless presbytery of two bays, the new work, which has fortunately come to us in a singularly complete state, is seven bays long, with north and south aisles. It also includes a new story to the west sides and the ends of the transepts, and the rebuilding of the range of chapels east of them. On the south side of the fifth bay of the new work there is attached to the

aisle a vestry, as at Selby and St. Mary's Abbey, York.

A careful examination of the work shows in what order it was built, and throws light on the plan of the earlier church.

The first part undertaken seems to have been the north transept. On its east side was built a new arcade of three arches opening into two new chapels and the north choir aisle. The triforium above has in each bay a double opening with pointed heads, with a sunk quatrefoil between, and the clearstory a single pointed window. On the west side, the clearstory forms an additional story to the Norman work. In the north wall a large triplet of lancets replaces the Norman windows.

It should be noticed that the vaulting shafts of the new work are corbelled off on the east side of the north transept just below the triforium level. This same feature is seen in the four first bays of the eastern arm, but not in the two next the crossing. In these the shafts are brought down and corbelled off just above the springing of the arches. The same arrangement also occurs in the south transept. Further examination will show that the section of the piers in the two bays next the crossing is different from the piers east of them, and there is also a marked difference in the arch mouldings, the western arches being of later date. Clearly, then, the eastern part was built first, so as not to interfere with the use of the old Norman presbytery, and when sufficiently complete to allow the services to be held in it, the old presbytery was taken down and the new work joined to the transept. The interval that elapsed before this was done is plainly shown in the modified design of the two last bays. We are enabled further to learn from this piece of architectural history that the old presbytery was only two bays long.

With the exception of the variation in the length of the vaulting shafts, the new work is of uniform design throughout. The beauty of the arcade depends entirely upon its arch mouldings and clustered piers. The triforium, as shown in Mr. Glennie's drawing, consists of two richly-moulded arches, both subdivided, with a sunk quatrefoil between; but in the last bay, which is narrower, the label is carried over so as to enclose both arches. The clearstory contains on the inside a tall pointed arch with sunk panels at the side, and externally a pair of lancets enriched with the dog-tooth ornament. The design of the east end is excellently shown in Mr. Glennie's drawing, but the bases of the triplet in the gable do not appear within. The south transept was the last work. In design it resembles the north transept, but the vaulting shafts are brought down lower, and the clearstory has in each bay three tall openings enriched with the dog-tooth ornament up the jambs.

Concerning the divisions and arrangements of the new eastern limb, many interesting facts can be made out from the building itself, aided by the Survey.

On the completion of the work the monks' choir was moved into the two westernmost bays, the stalls being returned against a stone *pulpitum* or loft under the east arch of the crossing. To accommodate this screen the piers of the arch are boldly corbelled off at some height from the floor, and higher up still are the holes for the beam for the rood and St. Mary and St. John. The crossing in turn now became the retro-choir, and was cut off from the nave by a screen described in the survey as "the perclose overthwart the body." The nave aisles were also shut off by screens, as may be seen from the holes for them; and there are marks of screens in the arch into the south choir aisle, and, high up, in each of the arches on the east of the north transept. In the south transept was, as usual, a "clokehouse and a clok therin complete." Against one of the piers on the east side are plain marks where there was "an image of Saynt Cristofer in a tabernacle sett betwene both this ii. chapells. The Survey further says of the "south crossaile," "a rofe all to brokyn with falling of the steple," and so we learn the fate of the tower over the crossing.

Between the arches of the new work, and extending for five bays from the tower, was the usual stone wall or screen. It was returned across behind the high altar, which stood in the third bay, and was, clear of the stalls, arcaded above its front. Between the fourth and fifth piers is the *gradus chori*, and immediately to the west of it, the "upper entrances" from the aisles. The choir and presbytery, therefore, each occupied two bays and a half of the new work.

The high altar, the site of which is marked by its huge and thick covering slab, had "tables of wood before the alter, and above the alter gyldyd," together with "x imagys gyldyd," and there was "a loft of tymber on the bakside of the of the high alter with a sele under hit all of wood." The marks of this are visible on the piers, and on the north side are other marks, where stood "an image of Our Lady gyldyd."

The second bay, that behind the high altar, was open for processions.

The first bay, and the ends of the two aisles, contained against the east wall a row of five little chapels. These were divided from each other by stone walls 9 ft. long and 1 ft. thick, which were continued in wood to meet "a faire parclose at the est end of the church, extendyng from the one syde of the church to the other," which partitioned "the fyve alters above rehersid." This parclose stood on a broad platform, two steps high, which crossed the church on the east side of the first pair of piers. Each altar stood on one step, with a floor-drain immediately below. Four of the altars had painted "tables" for reredoses, but the altar of St. John Baptist had "an alter table of alabaster on the altar." The pin-holes for fixing these tables are plainly visible on the east wall.

Without a plan, and in the overgrown and buried condition of the ruins it is very difficult to make a plan, it is not worth while to attempt to describe the monastic buildings. The arrangement is fairly normal, but the *cellarium* on the west side of the cloister which usually contained the frater and dorter of the *conversi*, is here represented by a mere "garnare," as the survey calls it. The frater was a fine hall built at right angles to the south side of the cloister, between the warming-house on the east and the kitchen on the west, but owing to the great drop in the ground, it is run out over a vaulted undercroft. On the east, next the church, was a vestry, and a lobby at the foot of the night-stair to the dorter, which is curiously contained in the gable. Then came the Chapter House, a noble room divided by four rows of columns into five alleys, with a large apse, of the width of three alleys, at the east end. Still further south were the parlour, a passage to the infirmary, and a large vaulted undercroft. Above all these, and extending over the Chapter House up to the church, was the monks' dortor. East of this was the infirmary cloister, with the *domus necessaria* on the south, and the farmery hall and its appendages on the east, but by the Suppression this seems to have been appropriated by the abbot as his lodging.

The conduit from whence the water was distributed by lead pipes throughout the Abbey is still running. It stands a little to the west. The precinct wall can also be traced, as may the site of the gatehouse. Close to this are the ruins of the *capella extra portas*.

Much could be said about the other remains of the monastery, but until the ruins are freed from the deplorable growth of trees, bushes, and ivy and accumulated rubbish, many interesting problems must be left unsolved.

W. H. ST. JOHN HOPE.

PAIR OF SEMI-DETACHED HOUSES IN THE MELBURY ROAD, HOLLAND PARK.

AN endeavour has been made, in building these houses, to recognise and accept the present conditions of house-building in London—more especially as regards the dirt and the impurities of the atmosphere. They are faced externally throughout with salt-glazed bricks, which, being of fire-clay vitrified at a high temperature, may be looked upon as proof against the disintegrating forces of the London air. These bricks, being virtually unchangeable, I have had to renounce the aid that time gives to a building by blunting its edges, softening and blending its colours: but as a *per contra* one has the satisfaction of knowing that the house is built of durable materials, wind-proof and rain-proof: and whatever effect one can manage to secure, that effect is indestructible. In the case of the usual brick house—whilst the brick and stone are ageing and weathering, the woodwork is periodically being renewed (in effect) by repainting—and the acquired harmony of the whole is constantly being dislocated by this renewal: but with these houses, every time the external woodwork is recoloured the bricks can be washed down and the original effect—for what it is worth—maintained. Internally great use has been made of glazed surfaces. The halls, passages, staircases, bath-rooms, &c., have their walls covered with tiles and their floors laid with marble. No baths, pipes, or sanitary fittings have casings.

The work is being carried out by Messrs. Walter Holt & Sons, builders, of Croydon.

HALSEY RICARDO.

COMPETITIONS.

MATER INFIRMORUM HOSPITAL COMPETITION, BELFAST.—In this competition thirteen designs for a building to cost 20,000*l.* were sent in on May 31 to the assessor, Mr. Thomas Drew, F.R.I.B.A., President of the Irish Institute of Architects, under conditions which secured perfect anonymity, and he has placed four designs in order of merit, thus:—1st. W. J. Fennell, Belfast; 2nd. W. J. W. Ferguson, Belfast; 3rd. G. W. Ferguson, Belfast, and A. J. Gordon, London; 4th. A. J. Jackson, Belfast. The assessor recommends that the second, third, and fourth competitors should be frankly informed that the competition is practically decided by the excellence of planning of No. 1, and that a second competition could not vary the respective merits of the general designs.

EXTENSION TO MARKET, &C., LANCASTER.—In a public competition for extension to the markets and a new Market Hotel, the Corporation of Lancaster have awarded the first premium of 75*l.* to Mr. Barton, of Manchester, and the second premium of 25*l.* to Mr. R. Walker, F.R.I.B.A.

SEWAGE DISPOSAL, MONMOUTH.—At the monthly meeting of the Monmouth Town Council, held on Monday, the report of Messrs. Bramwell & Harris, of Westminster, on the competitive schemes for the disposal of the sewage of the borough of Monmouth, was read, and the premium of thirty guineas for the best scheme awarded to Mr. W. H. Radford, Nottingham, and the premium of twenty guineas for the second best to Messrs. John Parkin & Son, of Westminster.

HUDDERSFIELD INFECTIOUS HOSPITAL.—We understand that the designs for this were delivered on the 29th ult., between forty and fifty sets having been sent in. The "Instructions" promised that there should be an assessor appointed by the Institute of Architects, and a Medical Officer of Health of an important borough to assist in the selection.

Correspondence.

To the Editor of THE BUILDER.

SEWER AND DRAIN VENTILATION.

SIR,—In his letter on pp. 501-2, Mr. Read states that the advocates of "interceptors" admit that they interfered with the ventilation of the sewers. Now, we make no such admission so far as the right or proper ventilation of the sewers is concerned. Sewers are put in at the expense and for the benefit of the community, and the community have a right to have them constructed in the most beneficial manner, and their ventilation is merely an item in the general expense. The engineer who cannot so construct and ventilate the public sewers as to make them independent of the private soil-pipes in our houses is a bungler, and his attempt to hide his own incompetency at the expense of the occupiers of houses only makes matters worse.

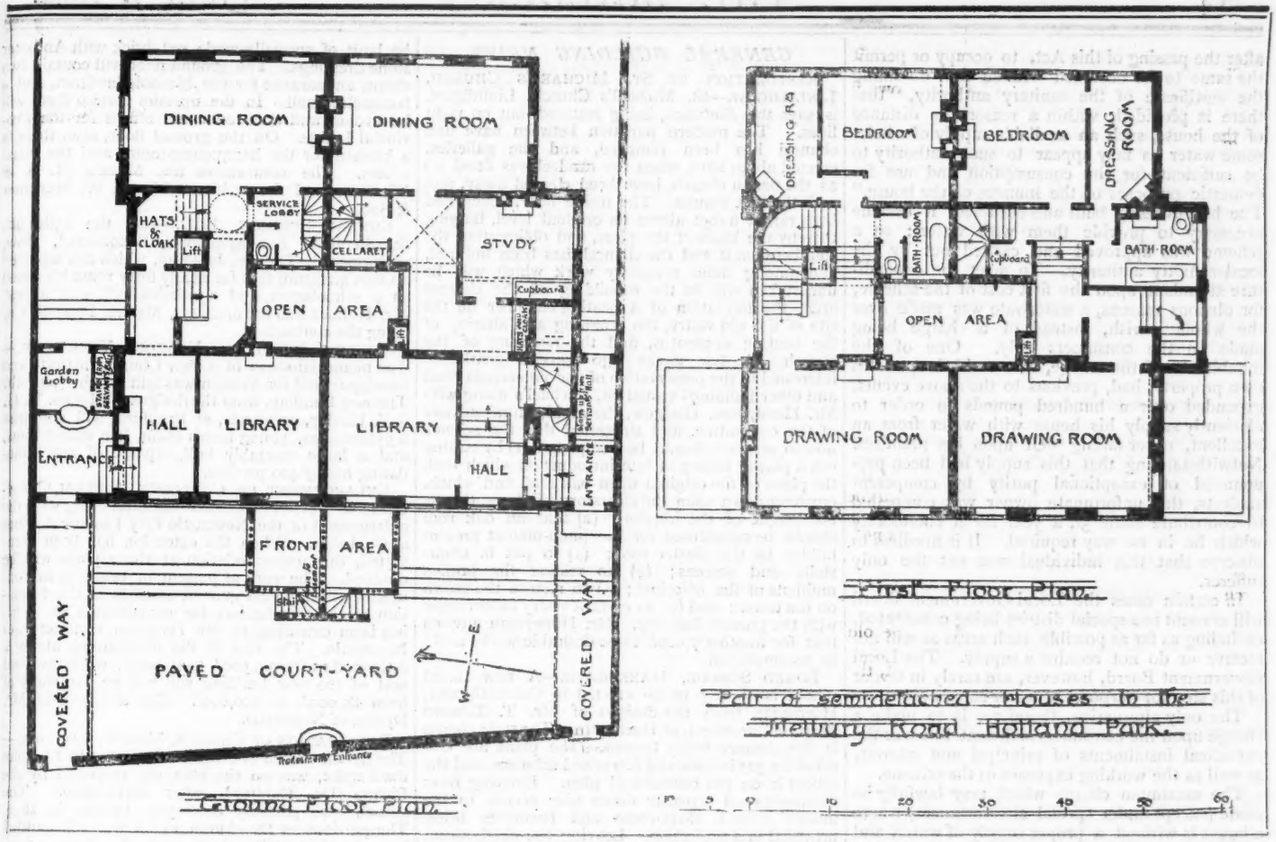
Mr. Read writes not only against the general opinion of the members of his own profession, but he has the medical profession dead against him, while also in this relation the opinion of educated and experienced plumbers should count for something.

The fourth paragraph in Mr. Read's letter, in which he tells us about the rise and fall of the sewage flow, and that it is least between midnight and 6 a.m., tells dead against himself; for it shows the necessity for the interceptor to lock off the extra amount of sewer-gas generated—when people are lying in their beds with windows shut—from the exposed portions of the sewer below the maximum flow. I happened to meet Dr. Carmichael a few days ago, when this subject was referred to. He, as a medical man who had given particular attention to the subject, protested strongly against the removal of the intercepting trap between the house and the public sewer.

On page 502 Mr. Read refers to the water-flow as being the chief agent in sewer ventilation. In this opinion he is dead against Mr. W. Santo Crimp, M.Inst.C.E., who, after elaborate experiments, asserts that the wind is the chief agent.

Mr. Read is also drawing upon his imagination when he writes about the sewer gas bubbling up through water-traps with 2 in. of water-lock, to the detriment of the drains behind them. In cases of this sort there is something wrong, or that the mouth or outlet of the drain was below water-level, in which case the drain as a ventilator for the sewer would be useless.

Mr. Read speaks of "a good 'wash-*down*' pan



and trap-closet." As a plumber I admit a good wash-down closet is good, but I think a "pan" closet bad. Mr. Read seems to have got a little mixed here.

As to the one or two individuals who assert the absence of the interceptor is a benefit to the occupiers of the house, I do not believe them. I have personally examined places where similar notions had been carried out, to the benefit of those interested, it was stated; but when I saw them I had to style the report a false one, and after the *exposé* the things had to be altered. Persistence in a bad plan is no proof of its goodness.

Mr. Read has entirely ignored the benefit of the interceptor in locking off rats, as also the protection the interceptor has been in many cases while railway tunnels have been cut through below our streets and the blasting disturbed the drain of the houses. Altogether, Mr. Read's advocacy of the abolition of the interceptor is a very poor one, and is entirely based upon very shallow and often fanciful premisses. W. P. BUCHAN.

Glasgow. June 30th, 1894.

Sir,—In the letter by Mr. R. Read, City Surveyor, Gloucester, in your last week's issue, he mentions my late father's name as an instance of an experienced engineer having advocated the principle of connecting all water-closets direct with the sewers, this having been done in Frankfort-on-the-Main. Although this was to a great extent done by my late father when carrying out the drainage of Frankfort, yet Mr. Read should bear in mind that nearly the whole of the sewers in that town were entirely reconstructed, and only on the connexion of the house drains with these new sewers was this system of doing away with interceptors adopted; as special facilities and provisions for flushing and cleansing were then in force, such as probably existed nowhere else. For further particulars I refer Mr. Read to the paper read at the Sanitary Congress in 1885 at Leicester by my late father on "Continental Drainage." In no instance could my late father be called an advocate of Mr. Read's system, where the connexion was made with old sewers, and where the flushing arrangements were not perfect; and unless he knew the main sewers to be well constructed and ventilated by open gratings, he would always insist on an interceptor being placed between soil pipe and sewer, combined with a fresh air inlet. T. S. GORDON.

July 3, 1894.

THE ROYAL INSTITUTION.—The managers of the Royal Institution have accepted from Mr. Ludwig Mond, F.R.S., the gift of the freehold of No. 20, Albemarle-street, with the object of enabling the Royal Institution to carry out a long-cherished scheme of a chemical research laboratory in connexion with the Institution. The freehold of the property is offered by Mr. Mond on the express understanding that it is to be used for this purpose, and that the laboratory is to be called "The Davy-Faraday Research Laboratory of the Royal Institution."

The Student's Column.

DETAILS OF RURAL WATER SUPPLY.—I.

PRELIMINARY.

THE benefit of a plentiful supply of wholesome water in the country is hardly to be over-estimated. Until recent years general systems of supply were almost entirely confined to towns; and, except in a few cases, where liberal-minded landowners carried out gravitation, or even small pumping schemes for the supply of water to their estates, rural populations were largely dependent upon open streams and shallow wells, which are always liable to pollution. The necessity for a proper supply of water to towns and congested populations generally is evident to all; but the idea that there should be any difficulty in procuring potable water in the country would seem incredible to most people who had not made rural life more or less of a study. The matter, however, rises to great importance when we remember that country areas are the source of supply of most of the food which is consumed in towns; and that when, for instance, a farm supplies milk for sale, any evil conditions under which that milk is produced follow it; and an impure water supply at a farm is frequently the cause of an outbreak of typhoid fever amongst the consumers of the milk at a distance.

A great change has, however, recently taken place, and schemes of rural water supply, especially in the Midlands, have become as plentiful as blackberries. This is partly attributable to the advance in sanitary knowledge, and to the necessities of rural populations becoming daily more pressing. Sources liable to pollution tend to become more polluted, and pollution, generally speaking, is cumulative. The recent exceptionally dry seasons have brought to light distressing cases of privation, and one exposure has led to others.

The Local Government Act, 1888, has enabled County Councils to put considerable pressure upon local authorities, when they are of opinion, on the report of their Medical Officer of Health, that such authorities are not properly performing their duties under the Public Health Acts, one of which is to provide efficient water supplies for their districts.

The Local Government Act, 1894 (commonly known as the Parish Councils Act) includes two sections, which will probably facilitate the provision of many rural water supplies, which have hitherto appeared impracticable.

Sec. 8 gives power to a parish council "to utilise any well, spring, or stream within their parish, and providing facilities for obtaining water therefrom, but so as not to interfere with the rights of any corporation or person."

Sec. 16 provides that where a parish council resolve that a rural district council ought to have provided the parish with a supply of water "in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water" (Public Health Act, 1875, sec. 299), complaint may be made to the County Council, which may transfer those duties to itself, or may appoint a person to perform the duty.

There are very important differences between urban and rural water supply, which make the difficulties to be contended with much greater in the latter than in the former. Except where the scheme is carried out by private individuals, for the benefit of their estates, the duty of providing an efficient water supply usually devolves upon the Local Authority.

By the Public Health Act, 1875, sec. 299, it becomes the duty of a local authority to provide their district with a supply of water, "in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water, and a proper supply can be got at a reasonable cost." The money for carrying out such a supply is usually obtained on loan (after a Local Government Board inquiry), repayable by yearly or half-yearly instalments of principal and interest in thirty years. The present rate of interest is usually 3½ per cent. per annum, which makes the annual instalment 5*l.* 8s. 9d. per cent.

This annual charge, together with the working expenses, has to be met either by a water-rate over the whole area, or by charges made upon the consumers, or by both. In an urban district, where nearly the whole of the population benefit by the supply, a water-rate is not necessarily a hardship; but in rural districts, where the area is determined by parish boundaries, and only a small portion of the population benefit by the supply, the case is different. As a consequence of the shuffling which frequently becomes possible through the intricacies of the law upon the subject, the few are sometimes benefited at the expense of the many. A small village had a fairly good water supply, but it included a patch of elevated ground excellently suited for building sites, but where water was conspicuous by its absence. Largely through the instrumentality of a local architect, himself a leading member of the local sanitary authority, this patch of ground was covered with houses of the villa class, in spite of Section 6 of the Public Health (Water) Amendment Act, 1878, which makes it unlawful in any rural district for the owner of any dwelling-house which may be erected or rebuilt

after the passing of this Act, to occupy or permit the same to be occupied without first obtaining the certificate of the sanitary authority, "that there is provided, within a reasonable distance of the house, such an available supply of wholesome water as may appear to such authority to be sufficient for the consumption and use for domestic purposes of the inmates of the house." The houses being built and occupied, it became necessary to provide them with water; so a scheme was approved and carried out by the local sanitary authority. To meet the expenditure attendant upon the first cost of the scheme, for obvious reasons, a water-rate was made over the whole parish, instead of a charge being made on the consumers only. One of the inhabitants of the village, who resided upon his own property, had, previous to the above events, expended over a hundred pounds in order to efficiently supply his house with water from an excellent, never-failing well upon his premises. Notwithstanding that this supply had been pronounced of exceptional purity by competent analysts, this unfortunate owner was compelled to contribute some 5*l.* a year for a commodity which he in no way required. It is needless to observe that this individual was not the only sufferer.

In certain cases the Local Government Board will consent to a special district being constituted, excluding as far as possible such areas as will not receive or do not require a supply. The Local Government Board, however, are rarely in favour of this step for purposes of water supply alone.

The only alternative, therefore, is to make a charge upon the consumers sufficient to cover the periodical instalments of principal and interest, as well as the working expenses of the scheme.

The maximum charge which may lawfully be made (except under special circumstances) where a house is without a proper supply of water, and where a supply is enforced by a local authority, is 2*d.* a week per house, or 8*s.* 8*d.* a year. Where, however, the supply is given by agreement, the authority may make such reasonable charge as they think fit. Where the rate is levied upon the consumers only it must be so adjusted as not to produce a profit which would benefit the ratepayers at large at the expense of the consumers.

A usual charge is 2d. per week for houses with a rateable value under ten pounds per annum, and 5 per cent. per annum when the rateable value exceeds that amount. This scale averages 5 per cent. per annum throughout.

If the annual instalment of principal and interest, together with the working expenses, does not exceed 5 per cent. on the rateable value of the property supplied, the scheme can be made self-supporting, as the remainder of the parish or parishes, receiving no benefit from the supply, need not be made to contribute. If, however, the expenditure exceeds the receipts, the balance must be met by a special water-rate levied over the whole area, irrespective of benefit.

As the rateable value of rural is considerably less than that of urban districts, area for area, and as the length of pipe necessary for the supply of a given number of houses is many times greater, the first cost of a water-supply scheme for a rural area must of necessity be made relatively small and the working expenses reduced to a minimum. To secure this end gravitation schemes are usually the only means which can be entertained, as the 5 per cent. above-mentioned rarely allows a sufficient margin for the working expenses of a pumping establishment. Occasionally a self-acting pumping system becomes possible where a fall of water can be utilised to work a water-wheel, turbine, or hydraulic ram.

In the following papers it is proposed to deal with such schemes as are usually feasible in rural districts, taking the above remarks into consideration. The various systems for affording such supplies will be described in detail, the principles explained, the machinery and materials carefully described, and the necessary information supplied both for preparing and carrying out the schemes. Plans, sections, specifications, and estimates of cost will be given, and, where possible, detailed prices of materials and workmanship will be indicated.

ARCHITECTURAL ASSOCIATION.—The visit to Knole House, announced in our advertisement columns for last Saturday, is in repetition of that which was fully described in the columns of the *Builder*, see p. 227, vol. 59.

APPOINTMENT OF COUNTY ARCHITECT.—Mr. M. H. Medland has been appointed Architect to the Gloucestershire County Council, in succession to his father, the late Mr. James Medland.

GENERAL BUILDING NEWS.

RESTORATION OF ST. MICHAEL'S CHURCH, LINLITHGOW.—St. Michael's Church, Linlithgow, is, says the *Scotsman*, being restored, but on right lines. The modern partition between nave and chancel has been removed, and the galleries, erected about 1812, when the chancel was fitted up as the parish church, have been cleared away, and with the best results. The inside floor, which had been raised a foot above its original level, burying thereby the bases of the piers, and obliterating the step between it and the chancel, has been lowered, and among other necessary work which will be undertaken will be the rebuilding of the chancel arch, the formation of a heating chamber on the site of the old vestry, the renewing and altering of the heating apparatus, and the reseating of the church. A few weeks ago several gentlemen interested in the preservation of our old ecclesiastical and other buildings visited St. Michael's along with Mr. Honeyman, Glasgow, the architectural adviser of the committee, and suggested that the scheme now in progress should be completed (1) by cutting out a plaster ceiling of late introduction which took the place of the original open oak roof, and which, crushing down upon the clearstory windows, dwarfs the height of the interior; (2) that an oak roof should be substituted for the pitch-pine at present hidden by the plaster roof; (3) to put in choir-stalls and screens; (4) to restore the broken mullions of the triforium; (5) to restore the crown on the tower; and (6) to erect a vestry in harmony with the present building. Mr. Honeyman advised that for another 7,000*l.* these desirable works could be accomplished.

BOARD SCHOOL, HARROGATE.—A new Board school is shortly to be erected in Coldbath-road, Harrogate, from the designs of Mr. T. Edward Marshall, architect, of Harrogate. The style chosen is Renaissance freely treated. The plans are certified for 305 infants and 620 mixed scholars, and the school is on the central-hall plan. Entering from Coldbath-road separate doors give access to the infants' school, cloak-room and lavatories being provided in a projection. Leaving the cloak-room, the infants file right and left into the ground-floor central hall, one-half of which is devoted to their use. Their five class-rooms are divided from the central hall by glass screens. The mixed school will use the other half of the hall, and for them two class-rooms are provided. Ascending to the first-floor by staircases, on the north and south sides of the building on the mezzanine floors are provided rooms for the teachers, with lavatories. The central hall is 73 ft. long by 32 ft. wide, from which open out, divided as on the ground-floor by glass screens, three class-rooms on either side, two to seat sixty and one seventy scholars. In the main building space is found for the boilers, a store-room, and coal-cellars in the sunk basement on the north side where the ground falls away. Abutting on the west side of the playground boundary-wall a two-story building will be erected for a cookery instruction centre, on the ground-floor, the first-floor, reached by a flight of outside steps, being devoted to manual instruction. Separate playgrounds with covered playsheds are provided at the rear of the building.

CONGREGATIONAL CHURCH, WEST HAMPSTEAD.—A Congregational church is being built at the corner of Finchley and Burrard-roads, adjoining Hackney College. The plan of the church is that of the "Central Area" type of church building, and accommodation is provided for 900 worshippers. Five doorways have been provided on the ground floor, and lobbies are placed at the entrances. The floor of the church will be formed of solid wood blocks laid on cement concrete. The style of architecture adopted is Gothic. The whole of the external walls will be faced with red bricks, and the ornamental dressings will be of terra-cotta and of moulded bricks. The roof of the church will be supported by hammer-beam principals, which will be exposed to view, the spaces between being plastered. The internal faces of all walls will be plastered. The windows will be filled in with stained glass. The roof will be boarded, felted, and covered with green slates. The pews, gallery front, roof principals, and all internal woodwork will be made of pitch-pine. The school department contains a hall, with a nave and two aisles, and the aisles are so arranged that six class-rooms can be formed on each side of the hall. The school hall will afford accommodation for about 500 persons, whilst the infants' class-rooms will seat about 100 children. A library, a large class-room, and kitchen will complete the school department. Accommodation is also provided for a caretaker, and a living room, scullery, and two bedrooms are included in this scheme. At the present time the church alone is being built, and the contract for this and the two vestries, the boundary walls, &c., is being carried out by Mr. T. H. Kingerlee, of Oxford, at a cost of 7,919*l.* 10s. Messrs. Spalding & Cross are the architects for the buildings, under whose supervision the work is being carried out. Mr. W. H. Gathercole is the clerk of the works.

MASONIC BUILDINGS, LINCOLN.—The foundation stone of the new rooms intended to be erected in Mint-street, Lincoln, for the accommodation of the Freemasons at Lincoln, has just been laid. The new building will be in the Georgian style, and will have a frontage to Mint-street of over 50 ft. It will be built of specially-made red brick with Ancaster stone dressings. The ground floor will contain two shops, an entrance for the Masonic brethren, and a banqueting-hall. In the upstairs portion there will be a room and ante-room and offices for the Provincial Lodge. On the ground floor, also, there is a kitchen for the banqueting-room, and the usual offices. The contractors are Messrs. H. S. & W. Close, and the architects Messrs. W. Mortimer & Son.

SUNDAY SCHOOLS, BOW.—On the 25th ult. St. Stephen's Sunday-schools, Saxon-road, Bow, were opened. The new building, which has replaced an iron structure that for nearly forty years was used as a schoolroom and a mission-hall, cost 2,000*l.* Mr. Holmes was the architect, Messrs. Perry & Co. being the contractors.

CHURCH INSTITUTE, YEADON, YORKSHIRE.—The memorial-stone of a new Church Institute and Sunday-school for Yeadon was laid on the 30th ult. The new building, from the designs of Messrs. T. H. & F. Healey, architects, of Bradford, will comprise a gymnasium, young men's room, four class-rooms, and a large assembly hall, capable of accommodating nearly 400 persons.

ENLARGEMENT OF COXLODGE ASYLUM, NEWCASTLE.—A commencement has been made with the enlargement of the Newcastle City Lunatic Asylum at Coxlodge. When the extension has been completed, the accommodation at the asylum will be doubled. The work at present in progress in connexion with the enlargement consists in the formation of the foundations, the construction of which has been entrusted to Mr. Ferguson, contractor, of Newcastle. The cost of the foundations alone is estimated at from 9,000*l.* to 10,000*l.*; while the total cost of the new building will not be far short of from 80,000*l.* to 100,000*l.* The architect is Mr. Dyson, of Newcastle.

RESTORATION OF CHURCH, MISSON, LINCOLN.—The parish church of Misson, dedicated to St. John the Baptist, was on the 26th ult. reopened by the Bishop (Dr. Ridding), after restoration. The church was partially destroyed by fire in 1893. The portions of the church which were dismantled have been rebuilt, at a cost of about 1,350*l.* For the restored portions of the structure the architect was Mr. J. Hodgson Fowler, of Durham, and the builders were Messrs. Bowman & Sons, of Stamford. New roofs have been added to the nave and north aisle, and that of the south aisle made good, two new floors placed in the tower, the walls repointed, the chancel floor raised, the old seats renewed and new ones supplied where required. The four old bells which were hurled to the ground and shattered to fragments have been replaced by six new ones, cast by Messrs. Warner & Co., of London.

WESLEYAN CHAPEL, WHITCHURCH, NEAR CARDIFF.—The foundation-stone of a new Wesleyan chapel for Whitchurch was laid on the 27th ult. The new chapel is to be of the Gothic style, the plans of which have been designed by Mr. Charles C. Jones, architect, Cardiff. Its length is to be 80 ft., and its width 40 ft., with schoolrooms at the back. The cost is estimated at about 1,000*l.*, and the contractor is Mr. H. Davies, Canton, Cardiff.

CHURCH RESTORATION AT BRIDGEND.—The restoration of the chancel of Newcastle Parish Church, Brigdend, has just been completed. The new chancel is 28 ft. 6 in. long, 18 ft. 9 in. high to the wall plate, 29 ft. to the apex of the roof, and 20 ft. 6 in. wide. The plans were prepared by Mr. E. M. Bruce-Vaughan, and the contract has been carried out by Messrs. Edmund Rees & Sons, Pencoed. The cost will be about 2,400*l.*

CASUAL WARDS AND PORTER'S LODGE, BEVERLEY WORKHOUSE.—The principal entrance of this building is to face Union-road, and is designed to correspond with the New Infirmary (just completed). The building comprises the porter's lodge, archway over the main road to the workhouse, and the male side of the casual wards. The casual wards are to consist of associated ward for twenty male vagrants, nine sleeping-cells, eight of which are to have work cells attached; also six stone-breaking bunks in yard; and an associated ward for eight female vagrants and sleeping-cells for four others. There are also to be receiving-rooms, bath-rooms, lavatories, water-closets, drying-rooms for clothes, and coal-houses for both male and female sides. The cells, &c., are to be heated on the high-pressure system, the apparatus being sufficiently powerful to maintain a uniform heat in the various rooms and cells of 60 deg. when the thermometer is at 32 deg. in the open; and 90 deg. in the two drying-rooms. There is also a disinfecting-room. Messrs. Hawe & Foley, of Beverley, are the architects.

NEW CHURCH, NORFOLK-SQUARE.—Mr. Ralph Nevill, F.S.A., has been appointed architect for the new church of All Saints', Norfolk-square, which is to replace that recently destroyed by fire.

BRITISH HOME FOR INCURABLES.—The new building of the British Home for Incurables was opened by the Princess of Wales on the 3rd inst. The site of the building is in Crown-lane, at the upper end of Streatham Common, the frontage being about 300 ft. The building has been erected from the designs of the late Mr. Arthur Cawston. The inmates are grouped into separate families, each with its own living-rooms, sleeping-rooms, service, and sanitary wing. The length of the building is

divided into two blocks. The western portion is stepped back 50 ft. further from the road than the eastern block, and the corridor runs at the rear of the patients' living-rooms, and has windows on its northern side. The total cost, exclusive of the chapel, the gift of Miss Leicester, has been 27,500*l.* The new home will accommodate 77 patients.

FOREIGN AND COLONIAL.

FRANCE.—The inauguration, at L'Isle Adam, of the monument to the painter Dupré, which should have taken place on Sunday last, has been adjourned in consequence of the obsequies of the late President.——Last week took place, at Mée, near Melun, the formal inauguration of the monument to Chapu, the eminent sculptor, who died in 1891. The monument consists of a sarcophagus, on which are engraved attributes of the art of sculpture, and a reproduction in white marble of one of Chapu's best-known works, "L'Immortalité."——The subject of the annual competition at the "École Spéciale de l'Architecture is, this year, "Un Théâtre de Station Thermale."——The work on the new Gare de Sceaux is nearly completed; there will soon remain only the large "salle des pas perdus" on the street level to construct. The official opening is announced for November.——At Angicourt (Oise) the work is to be commenced shortly for the new hospital for pulmonary diseases. The cost is estimated at 800,000 francs.——M. Dijos, architect, has been commissioned to prepare plans for a savings-bank building at Gourdon (Lot).——The jury of the exhibition organised at Amiens by the Société des Amis des Arts of the Somme, has awarded the gold medal in the section of architecture to M. Edmond Douillet, for his perspective view of the church of the Sacré Cœur at Amiens, Silver medals have been awarded to two other architects, MM. Joseph Antoine and René Delassus.——A fine arts exhibition is to be opened at Arcachon on July 15, in the beach casino; to close on the 30th.——The Commission des Monuments Historiques has acquired a portrait of the sculptor Geoffroy-Dechaume, which is to be placed in the Trocadéro Museum.——There is talk of erecting a monument at Paris in commemoration of President Carnot.

MISCELLANEOUS.

A SUBSTITUTE FOR VERMILION.—A sample of "Special Red, No. 5," manufactured by Mr. R. D. Stewart, of London, as a carefully-prepared cheap substitute for vermilion, has been submitted to us. The price is about one-fourth of that of genuine vermilion. Used either with oil or varnish its covering power and brilliancy are remarkable. Its permanency will probably be somewhat less than that of good vermilion, but for scores of purposes it can be legitimately used as an effective and, if judiciously employed, a highly decorative substitute. We understand that the preparation has found much favour in railway circles, and is used also by several large London firms. The same manufacturer sends us a sample of his "Soap Powder," or "Crystallised Soap," a saponaceous alkaline preparation for washing down paint and varnish work. It seems to be economical in use, and does not leave a greasy surface to interfere with the hardening and drying of the paint. Its other good points are: that it keeps well, has little smell, and is very portable.

THE CAUSES OF STRIKES.—The report of the Labour Department on the strikes and lock-outs of 1892 gives some particulars as to the causes of industrial disputes. In London some builders' labourers were foolish enough to strike because one of their number was discharged for smoking on the job. The main causes of dispute were as follows:—For advance of wages, 191; against reduction, 115; against alteration in working arrangements, rules, holidays, meal-times, &c., and against sub-contracting and importation of ready-dressed materials, 61; for alteration and improvement in working arrangements or method of payment, and for introduction of codes of working rules, 64; objection to working with and employment of non-unionists and to compel them to join the union, 32; defence of or objection to colleagues (apart from unionism) 39; and for reduced hours or against increase of hours, 18.

THE HORNSEY LOCAL BOARD AND THEIR SURVEYOR.—At the last meeting of the Hornsey Local Board the following resolution was passed:—"That the Board, in accepting the resignation of Mr. Thomas de Courcy Meade, M.I.C.E., on his appointment as City Surveyor, of Manchester, desire to place on record that he has been in their service as Engineer and Surveyor for more than thirteen years (having previously been their Assistant Surveyor for a few months) and that during the period for which he has held that position, he has conducted the business of his office, not only with the most scrupulous fidelity, but with great ability and credit to himself, and with undoubted advantage to the whole of the district under the jurisdiction of the Hornsey Local Board, the improvement in the sanitary condition of which is evidenced by the reduction of its death-rate in the last 10 years from 13·6 per 1,000 inhabitants to 11·33, notwithstanding its immense growth and development. During that time he has carried out many engineering and architectural works of considerable importance, and these, with the making up of many miles of roads and works of sewerage, are represented by an expenditure of about half-a-million of money. The Board, in parting with Mr. Meade, wish him every prosperity in his new and honourable position of Chief Surveyor to the Corporation of the City of Manchester."

REREDOS FOR ST. PETER'S, PONTARDAWE. GLAMORGANSHIRE.—A reredos has just been added to the Church of St. Peter's, Pontardawe. The centre canopy is cusped and moulded, and terminates with a carved stone cross. On each side are two niches, with the figures of St. Peter and St. John. The centre portion over the altar table is filled in with gold mosaic, and the "Agnus Dei" above in green and white mosaic. The arches on each side are supported with Numidian marble columns, with Irish green marble slabs at back. The stonework of the reredos, sedilia, and credence is of Caen stone, and has been carried out by Mr. William Dodd, of Morriston, from the designs of Messrs. Wilson & Moxham, architects, Swansea.

LEGAL.

BUILDING ACT CASE:

LOVEGROVE *v.* KIRK & RANDALL.

THIS case was in some respects similar to a case settled last year between the same plaintiff and defendants.

The defendants erected an irregular building in the goods yard, Appold-street, Finsbury, for Messrs. Ingham & Co., the well-known brickmakers, and refused to give notice to Mr. Henry Lovegrove, the District Surveyor, on the ground that the building was exempt under section 6 of the Building Act, 1855.

Mr. Shearman appeared as counsel, and called several officials of the London and North-Western Railway to prove that the structure was used for the purposes of the railway.

The District Surveyor conducted his own case.

Mr. H. J. Bushby, the magistrate, after careful consideration of the various points, decided that the builders should have given notice, and imposed a penalty of forty shillings with costs.

The railway company asked for a case.

MEETINGS.

MONDAY, JULY 9.

Clerks of Works' Association (*Carpenters' Hall*).—Monthly meeting. 8 p.m.

FRIDAY, JULY 13.

Liverpool Engineering Society.—Excursion to the Hydraulic Power and Electric Lighting Stations of the Manchester Corporation.

SATURDAY, JULY 14.

Architectural Association.—Visit to Oxford. (See advertisement on first page.)

Architectural Association Camera Club.—Visit to Battersea Polytechnic Institute. 2.30 p.m.

RECENT PATENTS

ABSTRACTS OF SPECIFICATIONS.

12,618.—WINDOW-SASHES: *A. Allen and others.*—This patent relates to an improved window in which, within the ordinary sliding-sash, is hinged a casement-sash having a lock fitted to the sliding-sash and a bolt projecting into a recess in the casement or in the frame. A sliding slip fixing the end of the cord to the sash-stile while concealing it, is also part of the invention.

14,595.—FACING TILES: *H. Hall.*—This patent relates to an improvement on two former patents. Projections and sunk holes are made on the under surface of the tile, and when pressing the tile on the cement the latter is forced through the holes, and by means of the cement laid on the lip or flange of the previously-fixed tile permanent keys are formed which hold the cement securely in position.

4,124.—WATER-CLOSET CISTERNS: *J. Merrill.*—This is an arrangement of parts ordinarily used in cisterns of this class disposed to secure quick and efficient flushing, and a treadle instead of a seat action to operate the mechanism.

5,321.—DAMPERS OR REGISTERS OF STOVES: *J. H. Watts.*—A spindle passes through the front of the stove, where a small handle or thumbscrew is attached. At a convenient point upon this spindle an endless thread or worm is fixed which works into a toothed quadrant affixed to the damper. By turning the handle or thumbscrew the damper or register can be raised or lowered to any degree, and the draught thus regulated as required.

8,156.—CHIMNEY COWLS: *C. Hitchcock.*—The various details of a lobster-back cowl are supplemented by the addition of a short vertical tube or outlet, open at both ends to prevent down draughts and to carry away smoke when fixed to a chimney carried up above the top of house.

8,194.—IMPROVED SAW: *G. Szekely* (Austro-Hungary).—A saw, the blade of which is provided with sawing teeth and planing teeth or blades in such manner that wood can be simultaneously sawn or cut, and planed on the cut surfaces.

8,283.—FIXING ROOFING SLATES: *F. Knights.*—In addition to ordinary nails a holding device is inserted within grooves formed in the sides of adjoining slates and supporting the lower edge of the superposed slate.

NEW APPLICATIONS FOR LETTERS PATENT.

JUNE 18.—11,756, S. Tomlinson, Fastener and Adjuster for Windows and Doors.—11,764, T. Crook, Brickmaking Machines.—11,770, G. Richardson, Rendering Doors, Windows, Casements, &c., Dust, Draught, and Waterproof.—11,786, S. Taylor, Casement Windows.—11,791, F. Dalhoff, Roofing Tiles.—11,803, R. Sibley, Frames of Drain-traps, &c.

JUNE 19.—11,820, J. Nicholls and J. Crooke, Window Sash-holder.—11,860, A. Oat, sen., Concealed Hinges.

JUNE 20.—S. Burgess, Hooks and Catches for Doors.—11,912, H. Tuke, Machinery for Moulding and Pressing Bricks, Tiles, &c.—11,953, The Falkirk Iron Co. and M. Buchanan, Kitchen Ranges.—11,969, R. Wallwork and A. Wells, Spraying Apparatus for applying Paint, &c., to Walls or other Surfaces.

JUNE 21.—11,973, J. Stow, Preparing Concrete.—11,980, J. Lakin and C. Johnson, Raising and Lowering Windows in Sashes, and as a Draught and Dust Excluder.—12,021, C. Wenste, Closing and Opening Gas-pipes or Connexions.—12,034, E. Reiss, Walls and Partitions of Buildings.

JUNE 22.—12,079, T. Hargreaves, Automatic "Tipper" for Flushing Waste Water-closets, Drains, &c.—12,098, E. Rawlins, Automatic Sash-fastener.

June 23. 12,153. G. Wheeldon, senr., Securing Window-sashes.—12,173, J. Money, Sliding Windows.—12,231, J. Roberts, Machine for Cutting Boards from Blocks.—12,233, A. Ward, Non-slippery Pavements.—12,232, G. Redfern, Door Closing Devices.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,858, W. Quelch, Sash-windows. 10,306, F. Harvey, Drain or Pipe Leakage Indicator. 10,572, C. Darrah and R. Brierley, Smoothing or Scraping Ceilings Preparatory to Whitening. 10,593, C. Chales de Beaulieu, Wall-papers. 10,805, J. Boswell, Door-steps. 10,897, C. Wilson and A. Pepperill, Tool for Pointing and Joining Brick, Stone, and other similar materials. 11,146, A. Reburn, Painters' and Plumbers' Lamps.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

16,323, W. Dransfield, Water and Gasplpe Hooks. 5,695, R. Schleicher and G. Wersing, Water Closets. 9,208, J. McCabe, Travelling Hangers for Doors, &c. 9,735, A. Boult, Ventilators or Blowers.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

JUNE 19.—By *J. J. Wheeler* (on the premises): The lease of the "Trafalgar Stone Works," Manresa-rd., Chelsea, u.t. 14 yrs., r. 50*l.*, 255*l.*

JUNE 21.—By *J. J. Wheeler* (at Chelsea): 1 Wellington-sq., Chelsea, u.t. 35 yrs., g.r. 10*l.*, 560*l.*—By *Humbert, Sott, & Flint* (at Harrow): A plot of f. land, Box Tree Lane, Harrow Weald, 0 a. 3 r. 24 p., 243*l.*; five f. cottages and a plot of land, 839*l.*; "The Laundry," Pinner Green, and 0 a. 3 r. 16 p., f., 390*l.*

JUNE 25.—By *Mullett Bcoker, & Co.*: 28, Cleveland-sq., Hyde Pk., u.t. 55 yrs., g.r. 22*l.* 4s., 1,800*l.*—By *A. H. Turner & Co.*: A f. cottage, Betchworth, Surrey, 280*l.*; a piece of land, about half-an acre, 840*l.*—By *King & Chasemore*: "Upper Bakers Farms," Slinfold, Sussex, and 59 a. 1 r. 33 p., f., 1,725*l.*; "Bakers Farm," 4a. 2r. 32 p. f., 700*l.*; enclosure of land, 22a. 3r., 19 p., 620*l.*; enclosure of land, Cranleigh, Surrey, 21a. 1r. 10p., f., 525*l.*; enclosure of land, 40 a. 0r. 39 p., 850*l.*—By *Collyer & Henderson*: 109, Rendlesham-rd., Clapton, f., r. 40*l.*, 780*l.*; 81, Rendlesham-rd., f., r. 30*l.*, 470*l.*; 87, London-rd., f., r. 34*l.*, 470*l.*; 6 and 8, The Cres., f., 550*l.*; 50 and 52, London-rd., u.t. 71 yrs., g.r. 12*l.*, r. 62*l.*, 680*l.*; 28, Avenue-rd., u.t. 60 yrs., g.r. 5*l.*, r. 26*l.*, 280*l.*; 35, 37, and 39, Avenue-rd., u.t. 74 yrs., g.r. 13*l.* 10s., r. 94*l.*, 810*l.*; 1A, Laburnam Cottages, u.t. 75 yrs., g.r. 2*l.* 10s., 105*l.*; 1 to 7, Laburnam Cottages, u.t. 75 yrs., g.r. 15*l.*, 590*l.*; 8 to 10, Laburnam Cottages, and "Ferndale Cottage," u.t. 75 yrs., g.r. 12*l.*, 600*l.*; 221 to 229 odd, Wick-rd., Hackney, u.t. 57 yrs., g.r. 8*l* 10s., 490*l.*—By *J. Bussey*: 117, Brunswick-rd., Bromley, u.t. 44 yrs., g.r. 3*l.* 10s., 175*l.*; 18, Wellington-st., f., 155*l.*; 28, Margery-rd., Forest Gate, u.t. 77 yrs., g.r., 6*l.*, r. 30*l.*, 250*l.*; 17, Margery-rd, f., 500*l.*; 8 and 9, Sussex-st., Poplar, u.t. 59 yrs., g.r. 5*l.*, r. 57*l.* 12s., 410*l.*; 23, Ellerthorpe-st., f., r. 25*l.* 4s., 300*l.*; 1 and 2, Surrey-ct., f., 210*l.*; 34, Cotton-st., f., 280*l.*; 30 and 31, Woolmore-st., f., 295*l.*—By *Rogers, Chapman, & Thomas*: I.g.r. of 52*l.*, Chester-ter., Belgravia, u.t. 27 yrs., no g.r., 774*l.*; i.g.r. of 20*l.*, Moreton-st., u.t. 39 yrs., g.r. 4*l.*, 310*l.*; i.g.r. of 60*l.*, Belgrave-rd., u.t. 33 yrs., g.r. 6s., 1,089*l.*; i.g.r. of 69*l.* 17s., Charlwood-st., &c., Pimlico, u.t. 39 yrs., g.r. 14*l.*, 1,306*l.*; i.g.r. of 21*l.*, Ponsonby-pl., u.t. 49 yrs., g.r. 2*l.*, 395*l.*; l g.r. of 39*l.*, Walton-st., Cadogan-sq., u.t. 48 yrs., 789*l.*; i.g.r. of 22*l.*, Finborough-rd., Brompton, u.t. 72 yrs., g.r. 1*l.*, 420*l.*; i.g.r. of 10*l.*, u.t. 68 yrs., g.r. 2*l.*, 161*l.*; i.g.r. of 26*l.*, Redcliffe-gardens, Kensington, u.t. 70 yrs., g.r. 1*l.*, 560*l.*; f.g.r. of 86*l.*, North-rd., Surbiton, reversion in 73 yrs., 2,290*l.*; f.g.r. of 30*l.*, St. James-rd., ditto in 73 yrs., 760*l.*; f.g.r. of 88*l.*, St. Philip-rd., ditto in 73 yrs., 2,253*l.*; f.g.r. of 62*l.* 10s., Anerley Pk., Anerley, ditto in 231 yrs., 1,575*l.*; f.g.r. of 20*l.*, Disraeli-rd., Putney, ditto in 74 yrs., 511*l.*; f.g.r. of 63*l.* 10s., Lisson-st., Marylebone, ditto in 62 yrs., 1,344*l.*; f.g.r. of 35*l.*, Cromwell-av., Highgate, ditto in 87 yrs., 897*l.*; f.g.r. of 46*l.* 10s., Dornton-rd., Balham, ditto in 79 yrs., 951*l.*

JUNE 26.—By *Weston & Son*: 7 to 13 (odd), Montesque-st., Canning Town, f., 10 to 16 (even), Clarkson-st., f., 35, 37, Clarkson-st., f., 1,000*l.*; 12, Overton-rd., Brixton, u.t. 65 yrs., g.r. 13*l.* 12s., 625*l.*; f.g.r. of 78*l.*, Kildoran-rd., with reversion in 89 yrs., 1,860*l.*; f.g.r. of 24*l.*, Lyham-rd., ditto in 89 yrs., 609*l.*; f.g.r. of 100*l.*, Mandrell-rd., ditto in 89 yrs., 2,370*l.*; 10, Wakehurst-rd., Wandsworth, u.t. 83 yrs., g.r. 7*l.*, r. 34*l.*, 285*l.*—By *Green & Son*: 11, Hebron-rd., Hammersmith, u.t. 87 yrs., g.r. 7*l.*, r. 40*l.*, 350*l.*—By *Driver & Perfect*: 34, 38, Ethelbert-rd., Margate, f., r. 63*l.*, 990*l.*; 1 to 8, Randolph-sq., f., 1,055*l.*; profit rental of 20*l.*, High-st., Kingsland, u.t. 72 yrs., 230*l.*; profit rental of 54*l.*, Marylebone-lane, u.t. 28 yrs., 500*l.*; profit rental of 40*l.*, Great Portland-st., u.t. 38 yrs., 510*l.*—By *Chancellor & Sons*: f. land, two acres, Ascot, 460*l.*—By *Alfred Richards*: 60, 62, Cadiz-st., Stepney, 1, 3, 9, 11, Knott-st., u.t. 12 yrs., g.r. 9*l.* 10s., 100*l.*—By *Debenham, Tewson, Co.*: "The Beedingwood Estate," near Horsham, of 274 acres, f., 20,000*l.*

JUNE 27.—By *F. W. Glazier*: 1 to 4, 7, 13, 14, Waldegrave-rd., Kensington, and 6, Waldegrave-ter., u.t. 64 yrs., g.r. 40*l.*, 1,930*l.*—By *E. & S. Smith*: No. 197, Kingsland-rd., u.t. 50 yrs., g.r. 7*l.* 7s., 520*l.*; 32, Lloyd's Row, Clerkenwell, u.t. 36 yrs., g.r. 12*l.* 10s., 200*l.*—By *W. R. Smith & Son*: No. 47, Lambeth Palace-rd., u.t. 30 yrs., g.r. 11*l.* 5s., 425*l.*; 13, 14, Osborne-ter., Clapham, u.t. 33 yrs., g.r. 15*l.*, r. 90*l.*, 655*l.*—By *A. Barton*: 18,

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Artisans' Dwellings, White's-lane, &c. Dublin	Dwellings' Committee of Corporation	S. Harty	July 10
Mission Church, Waskerley, Durham	.....	Clark & Moscrop	do.
*Furniture for Isolation Hospital	Willesden Local Board	O. Claude Robson	do.
*Wood Paving Works	do.	do.	do.
*Road Works, Green Lanes	Tottenham Local Board	P. E. Murphy	do.
*Supplying and Laying York Paving	do.	do.	do.
*Pipe Sewers, Scotland Green	do.	do.	do.
*Twenty-two Cast-iron Stand Posts	do.	do.	do.
*Patent Stone Paving, Willow Walk	do.	do.	do.
Drainage Works, Whiteinch, N.B.	Glasgow Police Com.	*Official*	do.
Toll House, Rhigos	Glamorganshire C. C.	do.	do.
Sewer, Washington, Staithes	Chester - le - Street U.R.S.A.	do.	July 11
*Seats and Tables, Workhouse	St. Giles, Camberwell.	do.	do.
*Levelling Ground, Forming Roads, &c.	Lewisham Burial Bd.	A. L. Guy	do.
Two Houses, Chapel-lane, Alnwick	J. Cowans	M. T. Wilson	do.
Houses, Ennets and Broomfold, Aberdeen	Ranald Macdonald,	.....	do.
Bridge over River Thame	Hyde Corporation	J. Mitchell	do.
Main Sewer, Balbriggan, co. Dublin	Balrothery Union	C. M. Tuite	do.
School Buildings, Stoneyhulme	Burnley School Board	A. Quarmby	do.
Pair Semi-detached Houses, Penmaenmawr, North Wales	.....	L. O. Williams	do.
Reconstructing Stansfield Bridge, Todmorden	West Riding C. C.	J. V. Edwards	do.
Flagging, Paving, &c.	Wardle (Lancs.) Loc. B.	F. Greenwood	do.
*Enlargement of Dining Hall, Workhouse	Islington Guardians	W. Smith	July 12
Four Houses, Carlton, near Barnsley	.....	J. W. Wilson	do.
Additions to Infirmary at Workhouse	St. Alban's Union	T. F. Woodman	do.
Forty Houses, Aberaman, Wales	Building Club	.....	do.
Eight Cottages, Gorton, Lancs.	M. S. & L. Ry. Co.	*Official*	do.
Railway Viaduct, Liverpool-street	Salford Corporation	Co.	do.
*Sewerage Works at Hadley	East Barnet Valley Local Board	G. W. Brumell	do.
*Alterations to Industrial Schools	Parish of St. George's-in-the-East	Wilson, Son, & Aldwinckle	July 13
*Painting Works at Infirmary	do.	do.	do.
Buildings, &c. at Workhouse	Nantwich Union	J. A. Davenport	do.
Sewage Disposal Works at Asylum, Morpeth	Northumberland Coun. Asylum Visitors	*Official*	July 14
Lecture Hall, Bangor, Ireland	Presbyterian Church Committee	.....	do.
School Buildings, Cold Bath-road	Harrogate Sch. Board	E. Marshall	do.
Road Works, Hirst-street, &c.	Batley Town Council	H. Dearden	July 16
House, Kent's-road, Torquay	.....	Edw. Richards	do.
Parish Hall, Brighton-grove, Newcastle-on-Tyne	.....	Crawford - Hick & Wilkinson	do.
*Clock Tower and Institute, Ledbury	Barrett - Browning Memorial Com.	B. Binyon	do.
*Making up Roads, Paving, &c.	Beckenham Loc. Bd.	J. A. Angell	do.
*South Wing and Children's Ward, &c.	Staffordshire Gen. Infirmary	Aston Webb	do.
New Roads and Sewers (1,600 yards)	Hayward's Heath Loc. Board	W. Beach	July 17
Baths, Red Bank	Manchester Corp.	*Official*	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Additions to Station, Scorrier, Cornwall	G. W. Ry. Co.	*Official*	July 17
Four Cottages, Waltham Sidings, near Maidenhead	do.	do.	do.
Iron and Steel Bridge over River Neath, Resolven, Glam.	do.	do.	do.
Improvements to Baths, Margaret-street	Liverpool Corp.	do.	July 18
*Purbeck Kerb	Woking Local Board	do.	do.
*Guernsey Granite Spalls	Wandsworth and Clapham Union	do.	do.
Water Main, Wroxall	Isle of Wight R.S.A.	T. R. Saunders	do.
*Fever Hospital, Shooters Hill	Met. Asylums Board	T. W. Aldwinckle	July 19
Vagrant Wards at Workhouse	Stroud Union	W. H. C. Fisher	do.
Improvement Works, George-street, &c.	Nelson (Lancs.) Corp.	J. W. Bradley	July 23
*Road Materials	Maidstone U.S.A.	F. Bunting	July 24
*Fence Wall at N.E. Hospital	Met. Asylums Bd.	A. & O. Harston	do.
Sanitary Work at Asylum, Knowle, Fareham	Visitors	J. Robinson	July 26
*Six Sanitary Spurs	Hants County Asylum	do.	do.
*Sanatorium Buildings	Tunbridge Wells Corp.	H. M. Caley	do.
*Electric Lighting Station, &c.	do.	A. Ardron	July 27
*Public Baths	Aylesbury Loc. Bd.	*Official*	July 28
*Corn Exchange, Fire Station, &c.	Oxford Corp.	H. M. Moore	do.
Additions to Schools, Bewicke	Wallsend Sch. Bd.	W. Hope	July 30
*Nineteen Shops and Houses	Lee Lodge Estate	F. & W. Stocker	Aug. 2
Settling Tanks, Filter Beds, &c.	Doncaster U.R.S.A.	*Official*	Aug.
Twenty Cottages, Llandebie, Wales	French Anthracite Co.	Jones & Co.	No date
*Rebuilding North Wing of Infirmary, &c.	South Molton Union	A. Thorne	do.
Warehouse and Stabling, Ashton-under-Lyne	J. Bicknell & Co.	T. George & Son	do.
House, Hooley Hill, Ashton-under-Lyne	.....	J. H. Burton	do.
Additions to Station, Broadley, Yorks.	R. Walker	.....	do.
Business Premises, Barry Docks, Cardiff	F. Ward	E. Axten	do.
School Buildings, Spotlands, Cardiff	.....	Habershon & Fawckner	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Engineer, Architect, and Surveyor	Corp. of Norwich	600*l.*	July 9
Surveyor	Carnarvon T. C.	140*l.*	July 14
*Draughtsman, Gold Coast	Crown Agents for Colonies	250*l.* &c.	do.
*Professorship of Architecture	University College, Liverpool	375*l.* &c.	July 25
*Assistant Surveyors, R.E. Civil Staff	Civil Service Com.	.....	Aug. 1
*Head-Master	Stoke-on-Trent School of Art	.....	No date

Those marked with an asterisk (*) are advertised in this Number. *Contracts, pp.* iv., vi., vii., viii., *and* ix. *Public Appointments, pp.* xxi. *and* xxiii.

Cavour-st., Kennington, u.t. 49 yrs., g.r. 3*l.*, r. 28*l.*, 250*l.*: 7, Albert-st., u.t. 49 yrs., g.r. 3*l.*, r. 32*l.*, 290*l.*; 84, Conningham-rd., Shepherd's Bush, u.t. 73 yrs., g.r. 6*l.* 10s., r. 30*l.*, 250*l.*—By *A. Savill & Son:* "The Priory Farm," Southend, 136a. 3r. 12p., f., 12,000*l.*—By *D. Young:* 27, 29, Stockwell-rd., Clapham, u.t. 66 yrs., g.r. 20*l.*, r. 105*l.*, 1,000*l.*

JUNE 28.—By *Harman Bros.:* 1, St. John's-st., Smithfield, f., r. 189*l.*, 4,000*l.*—By *J. J. Wheeler*, 25, Smith-st., Chelsea, f., 800*l.*—By *C. & F. Rutley:* "Elmstead," South-pk-hill-rd., Croydon; and a plot of land, f., 1,440. —By *Glasier & Sons:* F. land, Hendon, 11¾ acres, f., 1,000*l.*—*C. C. & T. Moore*, 4, Disraleigh-rd., Forrestgate, f., r. 30*l.*, 350*l.*; 9, 11, Cobden-sr., Bromley-by-Bow, u.t. 61 years, g.r. 6*l.*, 245*l.*—*Newbon & Co.:* 64, 65, 66, Frederick-st., Barnsbury, u.t. 58 yrs., g.r. 18*l.*, r. 90*l.*, 750*l.*; 25, 27, Kelvin-rd., Highbury, u.t. 65 yrs., g.r. 14*l.*, r. 80*l.*, 700*l.*; 19, Preston-st., Kentish Town, u.t. 54 yrs., g.r. 5*l.* 10s., 150*l.*—*Daniel Watney & Sons:* "Croydon Lodge," Croydon, and 14 a. 3 r. 10 p. f., 15,200*l.*—*Farebrother, Ellis, & Co.:* "Baddow Hall," near Chelmsford, and 121 a. 1r. 12p., f., 6,100*l.*—*Stimpson & Sons:* No. 117, Blackfriars-rd., f., 1,350*l.*; 27 to 33 odd, Opal-st., Kennington, c., 530*l.*; 582, Rotherhithe-st., Rotherhithe; 7, Silver-st.; and 17, Purnell-pl., f., 165*l.*; 7, Dalyell-rd., Stockwell, u.t. 70 yrs., g.r. 7*l.* 7s., r. 42*l.*, 265*l.*; No. 11 The Avenue, Barnet, f.. r. 50*l.*, 750*l.* 37, Carnarvon-rd., f., r. 25*l.*, 440*l.*—By *J. W. Truman:* 138, 139, 140, Alexandra-rd., Wimbledon, u.t. 77 yrs., g.r. 15*l.*, r. 170*l.*, 1,880*l.*; three plots of f. land, Fairlawn-rd., 150*l.*; three plots of f. land, Merton-rd., 460*l.*; cottage and workshops, Beulah-rd., f., r. 50*l.*, 640*l.*; 6 to 12 (even), Hartfield-rd., f., r. 195*l.*, 3,160*l.*; 16, Hartfield-rd., f., 660*l.*; 44, 46, 48, Hartfield-rd., f., r. 125*l.*, 1,920*l.*; 1 to 4, The Broadway, f., r. 260*l.*, 7,280*l.*; The Broadway, "Price's Yard," house and shop, f., r. 50*l.*, 1,060*l.*; the Police Station, f., r. 125*l.*, 2,300*l.*

JUNE 29.—By *C. P. Whiteley:* "Woodfield," Cedar-rd., Sutton, f., r. 65*l.*, 800*l.*—By *Briant & Son:* 172, Stockwell Pk.-rd., Brixton, u.t. 45 yrs., g.r. 3*l.* 16s. 8d., r. 44*l.*, 350*l.*; 32, Portland-pl. North, Clapham, u.t. 26 yrs., g.r. 3*l.* 6s. 8d., 245*l.*—By *E. & F. Swain:* 63, Whitfield-st., Fitzroy-sq., f., r. 55*l.*, 950*l.*; f.g.r. of 20*l.*, Butterswick Cottages, Hammersmith, reversion in 49 yrs., 670*l.*—By *Jones & Son:* F.g.r. of 7*l.*, Old Ford-rd., Bow, reversion n 73 yrs., 190*l.*; l.g.r. of 12*l.*, Burdett-rd., Mile End, u.t. 64 yrs., 270*l.*—By *W. Houghton:* 4½ acres, f. land, Ferry-lane, Walthamstow, 1,400*l.*; 46 to 52, Colne-rd., Twickenham, c., 560*l.*—By *R. Tidy & Son:* 33, Ockendon-rd., Islington, u.t. 47 yrs., g.r. 5*l.* 10s., r. 38*l.*, 345*l.*; 23, Umfreville-rd., Harringay, u.t. 93 yrs., g.r. 6*l.* 10s., r. 35*l.*, 290*l.*; 4, 15, Baker's Alley, Bow, u.t. 97 yrs., g.r. 35*l.*, 55*l.*—By *Holcombe & Betts:* 157, Cambridge-st., Pimlico, u.t. 37 yrs., g.r. 8*l.*, r. 55*l.*, 450*l.*; 30, 32, Isledon-rd., Holloway, u.t. 49 yrs., g.r. 13*l.*, r. 78*l.*, 720*l.*; 59, Oldfield-rd., Stoke Newington, u.t. 70 yrs., g.r. 5*l.*, r. 28*l.*, 270*l.*—By *Ball, Norris, & Hadley;* 8, Lorne Villas, Tooting, f., 300*l.*; "Claremont," Lonsdale-rd., Barnes, u.t. 78 yrs., g.r. 15*l.* 2s. 6d., r. 75*l.*, 695*l.*; 2, 4, 6, Rivercourt-rd., Hammersmith, f., r. 170*l.*, 2,610*l.*; 50, Mall-rd., u.t. 70 yrs., no g.r., r. 55*l.*, 830*l.*—By *Bean, Burnett, & Eldridge;* "Forest Glade," Whipps Cross-rd., Epping Forest, f., 615*l.*; 2, 3, 4, Forest Glade, f., r. 137*l.*, 1,955*l.*; 20, Pembroke Gardens, Kensington, u.t., 51 yrs., g.r. 10*l.*, 680*l.*; 17 to 31 (odd), Athol-st., Poplar, u.t. 68 yrs., g.r. 30*l.*, 1,550*l.*; 93 to 101 (odd), Teviot-st., u.t. 71 yrs., g.r. 22*l.* 10s., 1,410*l.*; 159, 161, 163, Brunswick-rd., u.t. 45 yrs., g.r. 14*l.*, 1,150*l.*; 122, 124, 126, Brunswick-rd., u.t. 79 yrs., g.r. 16*l.* 10s., 900*l.*; 185, 187, 193, Grundy-st., u.t. 48 yrs., g.r. 9*l.*, 455*l.*; 304, St. Leonards-rd., u.t. 76 yrs., g.r. 20*l.*, 220*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	8/0/0 — 9/0/0
Teak, E.I.	load	10/0/0 — 18/0/0
Sequoia, U.S.	ft.cu	2/3 — 2/6
Ash, Canada	load	2/10/0 — 3/15/0
Birch, do.	.....	2/10/0 — 3/15/0
Elm, do.	.....	3/3/0 — 4/10/0
Fir, Dantsic, &c.	.....	1/5/0 — 3/5/0
Oak, do.	.....	2/10/0 — 4/15/0
Canada	.....	3/15/0 — 7/5/0
Pine, Canada red	.....	2/10/0 — 3/0/0
Do. Yellow	.....	2/10/0 — 4/15/0
Lath, Dantsic, fath	.....	4/10/0 — 5/10/0
St. Petersburg	.....	5/0/0 — 6/10/0
Wainscot, Riga, &c., log	.....	2/5/0 — 4/10/0
Odessa, crown	.....	2/5/0 — 4/10/0
Deals, Finland	2nd & 1st std	10/0/0 — 10/10/0
Do. 4th & 3rd	..	7/10/0 — 9/0/0
Do. Riga	.....	7/10/0 — 9/0/0
St. Petersburg, 1st yellow	....	9/10/0 — 13/0/0
Do. 2nd yellow	....	8/0/0 — 9/0/0
Do. white	.....	8/10/0 — 11/0/0
Swedish	.....	8/0/0 — 16/0/0
White Sea	.....	7/10/0 — 16/0/0
Canada, Pine 1st		22/10/0 — 29/0/0
Do. do. 2nd	....	17/0/0 — 18/0/0
Do. do. 3rd, &c.		7/10/0 — 10/5/0
Do. Spruce, 1st		9/0/0 — 11/0/0
Do. do. 3rd & 2nd	.....	6/10/0 — 7/10/0
New Brunswick		6/0/0 — 7/5/0
Battens, all kinds		3/0/0 — 15/0/0
Flooring boards, sq., 1 in. prep. 1st	.....	0/9/6 — 0/14/6
Do. 2nd	.....	0/7/0 — 0/11/6
Other qualities	—	0/5/0 — 0/6/6
Cedar, Cuba	.. ft.	/3½ — /4½
Honduras, &c.		/3½ — /4½
Mahogany, Cuba		/3½ — /6
St. Domingo, cargo av.		/3 — 1/6
Mexican do. do.		/3 — /4
Tobasco do. do.		/3½ — /6
Honduras do.	..	/3½ — /5½
Box, Turkey	ton	4/0/0 — 13/0/0
Rose, Rio	.....	7/0/0 — 18/0/0
Bahia	.....	6/0/0 — 17/0/0
Satin, St. Domingo	.....	0/0/5 — 0/1/0

TIMBER (*continued*).

Satin, Porto Rico		0/0/6 — 0/1/6
Walnut, Italian	..	0/0/3½ — 0/0/7

METALS.

Iron—Pig, in Scotland	..... ton	2/2/0 — 0/0/0
Bar, Welsh, in London	.....	5/17/6 — 6/0/0
Do. do. at works in Wales	.....	5/7/6 — 5/10/0
Do. Staffordshire, in London	.....	6/0/0 — 6/10/0
COPPER—British cake and ingot		40/10/0 — 41/0/0
Best selected	..	41/0/0 — 41/10/0
Sheets, strong	..	50/0/0 — 0/0/0
Chili, bars	.....	38/7/6 — 38/12/6
YELLOW METAL	lb	0/0/4½ — 0/0/5
LEAD—Pig, Spanish	..... ton	9/3/9 — 9/5/0
English com. brands	.....	9/5/0 — 9/7/6
Sheet, English, 6 lbs. per sq. ft. and upwards	....	10/15/0 — 0/0/0
Pipe	.....	11/5/0 — 0/0/0
ZINC—English sheet	..... ton	19/0/0 — 19/0/0
Vieille Montagne	.....	19/10/0 — 0/0/0
TIN—Straits	.....	68/17/6 — 69/7/6
Australian	.....	69/10/0 — 70/0/0
English Ingots	..	72/10/0 — 73/0/0
Banca	.....	73/10/0 — 74/0/0
Billiton	.....	71/0/0 — 71/10/0

OILS.

Linseed	..... tun	20/10/0 — 20/15/0
Cocoanut, Cochin		28/10/0 — 0/0/0
Do. Ceylon	.....	23/15/0 — 24/0/0
Palm, Lagos	.....	23/10/0 — 0/0/0
Rapeseed, English pale	.....	21/0/0 — 21/5/0
Do. brown	.....	19/10/0 — 20/15/0
Cottonseed ref.	....	20/10/0 — 21/5/0
Oleine	.....	22/0/0 — 24/0/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined	.....	5/0/0 — 12/0/0
TAR—Stockholm	barrel	0/22/0 — 0/0/0
Archangel	.....	0/12/0 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursday.*]

ABBEYLEIX (Ireland).—For the execution of drainage and sewage disposal works, for the Union Guardians. Mr. W. Kaye Parry, C.E., 35, Dame-street, Dublin:—

W. Baird	£2,561 0 0	T. J. Dixon, Angle-sea-street, Dublin*	£1,718 14 3
J. Cunningham	1,984 14 0		

*Accepted.

ACTON.—For the erection of doctor's residence, stabling, fence, walls, &c., on the north side of Pembroke-road, Acton, for Dr. A. Cayley Hutchinson. Mr. Edward Monson, jun., architect, Acton Vale, W. Quantities supplied:—

Dorey & Co.	£2,895	G. Hooper	£2,790
Godsen & Sons	2,800	F. Nye, Ealing (accepted)	2,700

BARNET.—For entrance lodge at the Barnet Burial-ground, for the Trustees of the Barnet Chancel Estate. Mr. J. C. Traylen, architect, 16, Broad-street, Stamford:—

M. A. Pearson	£704 10	John Willmott & Sons	£605 0
W. James	690 10	N. Lidstone	576 0
Thos. Butcher	670 0	William Powey	568
W. T. Williamson	656 8	S. F. Halliday, Stamford, Lincs. (accepted)	499 19
Frederick Voller	620 0		

BARROW-UPON-SOAR.—For the construction of sewerage works, for the Rural Sanitary Authority. Mr. W. H. Simpson, C.E., Alliance-chambers, Horsefair-street, Leicester:—

John Hawley & Sons	£7,644 0 0	Thomas Smart	£5,700 0 0
J. & E. Bentley	6,785 0 2	W. T. Hall	5,590 0 0
R. Holmes & Co.	6,700 0 0	John Holme	5,510 6 7
Henry Hewett	6,598 0 0	William Moss & Son	5,480 0 0
Earl & Briggs	6,478 10 1	James Mason, Leicester*	5,407 8 6
Thomas Philbrick	5,984 16 7		

*Accepted.

BEDLINGTON (Northumberland).—For laying sewer-pipes, &c., Bomarsund and Barrington, for the Local Board. Mr. W. W Cooper, surveyor, Bedlington. Quantities by surveyor:—

J. Lacey	£410 0 0	G. E. Simpson, Newcastle-on-Tyne*	£244 17 6
J. Coxon	328 8 2		
J. Robson	273 2 11		

*Accepted.
[Surveyor's estimate, £260.]

BEVERLEY (Yorks.).—For the erection of porter's lodge and casual wards at the workhouse, for the Union Guardians. Messrs. Hawe & Foley, architects, Beverley. Quantities by architects:—

Geo. Scales	£2,321 0 0	Henry Greenlaw	£1,938 3
E. Good	2,207 12 6	J. R. Foley, Toll Gavel, Beverley	
G. Pape	2,000 0 0	(accepted)	1,885 15 3
Anty. Lyons	1,987 0 0		

[Architects' estimate, £1,874.]

BIRMINGHAM.—For metalling, kerbing, channelling, &c. Church-road and Old-lane, Selly Oak, for the Union Rural Sanitary Authority. Mr. Robt. Godfrey, C.E., Valentine-road, King's Heath, Birmingham:—

Mayes	£2,665 0 0

BROMLEY (Kent).—For the erection of a house in Bromley Park, Kent, from plans and specifications prepared by Mr. William H. Duffield, architect, 34, Queen-street, Cannon-street, E.C. Quantities supplied:—

Patman & Fotheringham	£1,951	Lowe	£1,715
Parker	1,825	Grubb & Sons	1,695
Payne	1,798		

BURTON-UPON-TRENT.—For the erection of school buildings, &c., for the Stanton and Newhall School Board. Mr. Henry Beck, architect, 30, High-street, Burton-upon-Trent :—

I. T. Varlow	£8,940	W. Hopkins	£8,040
H. Willcock & Co.	8,180	Henry Lovatt	8,000
Slater & Harrison	8,162	Geo. Kennard	7,892
I. Harley & Son	8,125	Thos. Lowe & Sons	7,870
Geo. Hodges	8,060	Richard Kershaw	7,555
Walker & Slater	8,050	W. E. Shaw, Ilkeston*	7,199

* Accepted subject to the approval of the Education Department.

CHARLTON (Wilts.).—For additional buildings to Manor Farm, for Capt. T. E. Fowle. Mr. James H. Money, architect. No quantities :

Huntley & Sons	£452 0 0	F. Toomer	£293 0 0
Henry Ash	299 10 0	Whatley & Co.	265 0 0

CHELTENHAM.—Accepted for the erection of a central electric lighting station, for the Cheltenham Corporation. Mr. Joseph Hall, Borough Engineer, Municipal Offices, Cheltenham.

Malvern & Son, Cheltenham £1,799 0 0

GATESHEAD.—For the erection of school buildings, Rose street, for the School Board of the Borough of Gateshead. Messrs. Thompson & Dunn, architects, 5, St. Nicholas-buildings, Newcastle-on-Tyne. Quantities by Mr. Geo. Bell :—

Sanderson & Co.	£4,840 0 0	Haswell & Waugh	£3,930 0 0
John Ross	4,359 11 10	Joseph Elliott	3,908 0 0
Edw. George	4,340 4 11	Thos. Hunter	3,872 0 0
Alex. Pringle	4,154 0 0	Alex. Bruce, Newcastle (accepted)	3,808 0 0
Thos. Lumsden	4,129 0 0		
John C. Hope	4,065 11 0		

GODALMING.—For the erection of Technical and Art School, for the Godalming Town Council. Mr. Sami. Welman, surveyor, Church-street, Godalming :—

T. F. Hall	£2,525	Mitchell Bros.	£2,393
Higglett & Hammond	2,445	R. Pink	2,295
F. Milton	2,396	T. H. Kingerlee	2,16

GLOUCESTER.—For the erection of a Council Chamber and other works, Shire Hall, for the County Council. Mr. M. H. Medland, County Architect, 15, Clarence-street, Gloucester :—

Willcock	£8,085	Hatherley & Carr	£7,115
Stephens & Bastow	7,898	Wm. Jones	6,950
Lissaman	7,700	H. A. Forse, Bristol*	6,899
Drew Brothers	7,675	*Accepted.	

GREAT BROUGHTON (Cumberland).—Accepted for the erection of two class-rooms, for the Great Broughton School Board. Mr. Marsh, architect, Cockermouth :—

Masonry and Plastering.—John Bolton, Cockermouth ... £155 10
Slating.—John Bolton, Cockermouth ... 40 10
Joining and Plumbing.—R. Grave & Son, Cockermouth .. 109 18
Painting.—Ponsonby Carruthers, Great Broughton ... 16 0

HARWELL (Berks.).—For the erection of school buildings, for the School Board. Mr. J. B. Seward, Wokingham. Quantities by Mr. W. H. J. Simmonds, surveyor, Reading.

W. H. Siary	£1,209 0 0	J. Buckle	888 0 0
George King	1,198 0 0	G. H. Wheeler	869 0 0
J. Smallbone	1,160 0 0	George Thatcher	654 10 0
W. A. Wheeler, Wantage (accepted)	1,099 8 6		

HASTINGS.—For decorative and sundry other works at The Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

Collinson & Lock	£2,122 4 8	H. E. Cruttenden	£1,769 0 0
Smee & Cobay	2,100 13 6	S. P. Miller	1,753 0 0
J. Lester	1,990 0 0	P. Jenkins	1,675 0 0
J. Crossley	1,820 13 0	H. Lancaster	1,500 0 0
H. King	1,770 0 0	J. Barkar & Co.	1,497 0 0

HASTINGS.—Accepted for sanitary work at The Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

W. B. Brown, Hastings £354 0 0

HASTINGS.—For verandah coverings and balcony railings at The Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

Macfarlane	£545 2 10	
The Coalbrooke, Dale Co.	453 12 0	
Geo. Wright (zinc roofing not included)*	£247 7 3	313 2 10
F. Braby (zinc roofing only)*	65 15 7	

* Accepted.

HASTINGS.—For repairs, alterations, and improvements at the Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

T. Salter	£2,279	H. E. Cruttenden	£2,195
J. Lester	2,277	P. Jenkins*	1,995

* Accepted at schedule prices.

HASTINGS.—For electric light fittings, and fixing at the Queen's Hotel, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

J. Barker & Co.*	£411 0 0	Hands	£310 9 9
Strode & Co.	346 11 0	Verity & Co.	306 19 0
Hastings Electric Light Supply Co.	343 18 4		

* Accepted at schedule prices.

HASTINGS.—Accepted for fibrous plaster decorative work at the Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings :—

Messrs. Geo. Jackson & Son, London £101

HASTINGS.—For electric light wiring at the Queen's Hotel, Hastings, for the Queen's Hotel Company, Hastings, Limited. Mr. Arthur Wells, architect and surveyor, Queen's Chambers, Hastings. Tenders from a schedule supplied by the architect, the specification describing the quality of the work being prepared by each competitor to accompany his tender :—

Spiers & Pond	£320 0 0	Roger Dawson & Co.	£300 0 0
Belsham & Co.	448 0 0	Raynes, Smith, & Co.	269 10 0
Hastings Electric Light Supply Co.*	358 13 4	Fowler, Lancaster, & Co.	265 0 0
Strode & Co.	343 0 0	*Accepted.	

HORNCHURCH.—For Cottage Homes at Hornchurch, for the Guardians of St. Leonard's, Shoreditch. Mr. F. J. Smith, architect :—

Holloway Bros.	£8,600	W. Shurmur	£8,190
Wells	8,827	Killingback	7,997
Simpson	8,750	Todd	7,870
White	8,485	Ivory	7,445
Allen & Son	8,365	Rons	6,730
Charteris	8,200		

HOVE.—Accepted for providing and laying kerbing and channelling, and execution of street works (three roads). Mr. H. H. Scott, Town Surveyor, Hove :—

Messrs. J. Parsons & Sons, Church-road, Hove £3,153 0 0

ILFORD.—For new retort house for Ilford Gas-works. Mr. J. Crouch, engineer, Parliament-street :—

Gregors	£974	Willmot	£877
Hammond	947	Watson (accepted)	836

KIRKCALDY (N.B.).—For causewaying Links-street, &c., with granite, for the Commissioners. Mr. Jas. L. Lumsden, Burgh Surveyor, Kirkcaldy. Quantities by the Surveyor :—

J. Kennedy	£3,906 1 0	R. McKay	£3,682 7 0
J. Fyfe	3,813 12 0	L. & W. McDonald, Inverkeithing*	3,245 17 0
J. Leith	3,798 0 4		

Links-street, Southerton Whinstone.

John Kennedy	£2,331 2 0	G. Smith	£2,295 0 0

Gas and Fergus Wynds.

R. McKay	£127 12 0	J. Leith	£76 5 6
J. Kennedy	92 1 6	J. Fyfe	76 5 6
L. & W. McDonald, Inverkeithing*	76 12 6		

* Recommended for acceptance.

LEEDS.—For the extension of the Whitehall Printeries, for Messrs. J. W. Petty & Sons. Mr. W. S. Braithwaite, architect, 6, South Parade, Leeds :—

Brick and Mason.—Charles Myers	£892 10 0
Carpenters and Joiners.—J. Ledgard & Son	404 11 6
Ironfounder.—Fredk. Dyson	118 18 0
Plumbers.—H. Braithwaite & Co.	95 0 0
Slater.—John Atkinson & Son	74 0 0

[All of Leeds.]

LEIGHTON BUZZARD.—For making alterations and additions to the Bassett-road Schools, for the School Board. Mr. J. T. Lawrence, architect, Leighton Buzzard. Quantities by the architect :—

Tutt Bros.	£420	Garside & Son	£360
F. Adams	395	Hart & Adkins	360
Edwards & Sons	384	D. Cook & Sons	349

[All of Leighton.]
[Architect's estimate, £350.]

LEYTON (Essex).—For supplying and laying 1,690 yards Norway granite kerbing; forming footpaths, &c., for the Leyton Local Board. Mr. W. Dawson, Surveyor, Town Hall, Leyton :—

J. Neave	£896 0 0	Fry Bros.	£737 15 0
E. Wilson	783 0 0	J. Jackson	630 0 0
Thos. Adams	763 12 8	W. Griffiths, Kingsland-rd., N. (accepted)	627 8 8
J. Reeves	749 5 10		

[Surveyor's estimate, £660.]

LEYTON (Essex).—For supplying and fixing three extra sludge presses at the Leyton Sewage Works. Mr. W. Dawson, Surveyor, Town Hall, Leyton :—

	Scheme A.	Scheme B.
S. H. Johnson & Co.	£696	£598
Musto & Co.	—	795

LEYTON (Essex).—For making up, kerbing, and draining private streets for the Leyton Local Board. Mr. W. Dawson, C.E., Surveyor, Town Hall, Leyton:—

E. Wilson	£6,161 0 0	J. Jackson	4,060 0 0
Fry Bros.	5,234 5 5	W. Griffiths	3,896 19 4
J. Neave	5,103 0 0	G. Wilson, Walthamstow*	3,877 16 10
Burrill	4,255 11 3		
J. Reeves	£4,241 8 8	*Accepted.	

[Surveyor's estimate £4,350 0 0.]

LLANDILO.—For building a pair of villa residences at Alan-road, Llandilo, for Mr. John Williams, Peytindu, Brecon. Mr. David Jenkins, architect :—

Thomas Brothers	£756	John Davies	£590
D. H. Jones	595	David Evans, Llandilo*	520

* Accepted.

LLANDEBIE.—For alterations and renovating Saron Baptist Chapel for the trustees. Mr. David Jenkins, architect :—

Daniel Jones	£140 0 0	Daniel Stephens	£115 0 0
D. H. Jones	138 10 0	John Davies, Swansea*	110 0 0

*Accepted.

LONDON.—For painting, whitewashing, and repairs at the Infirmary, Cale-street, Chelsea, for the Guardians of the Poor of St. Luke's, Chelsea. Messrs. Lansdell & Harrison, architects, 12, Compton-terrace, Highbury :—

F. Lapthorne & Co.	£697 0	G. Foxley, 36, King-st., Regent-st., W.*	£555 0
E. J. Cridlan	595 0		
G. Wade	574 15		

* Accepted.

LONDON.—For external repairs to St. Paul's Church, Canonbury, for the Vicar and Repairs Committee. Mr. F. W. Lane, architect, 152, Albion-road, Stoke Newington, N. Quantities supplied :—

Kerry & Hollidge	£897 15	Williams & Son	607 0
Quarterman	780 0	Wontner, Smith & Son	595 0
Killby & Gayford	714 0	Grover & Son	572 0
J. Allen & Son	680 0	McCormick & Sons	566 0
Patman & Fotheringham	652 0	Dove Bros. (accepted)	535 0
Shurmer	639 0	Voller (withdrawn)	486 0

LONDON.—For proposed shops, offices, and dwelling-houses, East India Dock-road, for Mr. J. Byford. Mr. Geo. Lamb, architect :—

J. Woodward	£3,600	J. H. Jackson	£2,850
F. & F. J. Wood	3,371	Courtney & Fairbairn	2,787
J. Holmes	3,170	W. J. Walker	2,777
W. J. Maddison	3,109	J. Edmonds	2,720
W. Shurmur	2,988	Gregar & Co.	2,687
McCormick & Son	2,969	Coulsell Bros.	2,487
G. Sharp	2,960		

LONDON.—For sewers at Topsfield Estate, Crouch End, N., for the Hornsey Local Board :—

Killingback & Co.	£8,765 0 0	Wilkinson Bros.	7,619 0 0
B. Cooke & Co.	8,505 0 0	W. Griffiths	7,329 9 0
T. G. Dunmore	7,884 10 6	T. Adams	7,138 12 6
John Jackson	7,764 17 6	Jas. Dickson, Townsend, St. Albans*	6,266 17 0
S. Hudson	7,699 6 4		

*Accepted.

LONDON.—Accepted for urinal at "The Woodman" public-house, Highgate :—

B. Finch & Co., 32, Belvedere-road, Lambeth ... £175 0 0

LONDON.—For wrought-iron fencing, for the Hornsey Local Board :—

	Per yard run.
Clark, Hunt & Co.	15s. 7d.
H. E. Mitchell & Co.	7 2
Raybould & Co.	7 1
Bayliss, Jones, & Bayliss, 139 and 141 Cannon-street, E.C. (accepted)	7 0½

LONDON.—For erecting workshop at Mare-street, Hackney. Mr. J. Hamilton, architect :—

Barrett & Power	£469	Rayner	£420
Hayworth & Son	465	G. W. Beale	415
W. Shurmur	432	G. T. Blow	409

LONDON.—For new premises at Golden-lane, E.C., for Messrs. Bean & Co. Mr. R. W. Price, architect :—

Sparks	£3,065	J. Smith & Son	£2,847
W. Shurmur	2,997	Patman & Fotheringham	2,781
Martin Taylor	2,900		

LONDON.—For rebuilding premises at Stratford, for Messrs. Young & Marten. Mr. W. D. Church, architect :—

Catley	£2,580	W. Shurmur	£2,177
Reed & Son	2,442	W. Watson	2,094
Gregar	2,247	Atherton & Latta	2,016
Larkes & Son	2,220		

LONDON.—For painting, &c., at the City of London Union, Homerton, for the Guardians. Messrs. Hammond, architects :—

Lidstone	£2,900	J. & H. Cocks	£2,700
F. & F. J. Wood	2,755	W. Shurmur	2,673
Larke & Son	2,754	W. & H. Castle	2,398

LONDON.—For new premises at Backchurch-lane, Whitechapel, E., for Messrs. Kinloch & Co. Mr. H. H. Collins, architect :—

Paramor	£26,663	W. Downs	£25,480
Sparks	26,296	Lascelles & Co.	25,470
Holland & Hannen	26,190	W. Shurmur	25,380
Grimwood	26,120	Ashby & Horner	25,265
Clarke & Bracey	26,000	F. & F. J. Higgs	24,873
Mowlem & Burt	25,920	Lovatt	24,853
T. Rider & Son	25,838	Lawrence & Co.	24,369
T. Boyce	25,800	Patman & Fotheringham	24,171
Foster & Dicksee	25,789	J. & J. Greenwood	22,660
Colls & Son	25,480		

LONDON.—For warehouse, &c., at Durward-street, Whitechapel, for Messrs. Kearley & Tonge. Mr. Wm. Eve, architect :—

Godfrey & Son	£6,987	J. Chessum & Son	£6,830
W. Shurmur	6,900	Killby & Gayford	6,684
F. & F. H. Higgs	6,899	Harris & Wardrop	6,683
Patman & Fotheringham	6,851		

LONDON.—For alterations, &c., 82 & 84, St. John-street, E.C., for Messrs. Munt & Co. Mr. Walker, architect, West-street, Finsbury :—

Falkner	£3,700	Irvin	£1,898
Young	2,439	Reason	1,875
Perkins	2,200		

LONDON.—For the erection of a mission building in West Ferry-road, North Greenwich. Messrs. J. E. K. & J. P. Cutts, architects :—

Lathey Bros.	£2,287	J. H. Johnson	£2,127
A. Porter	2,177	Harris & Wardrop	2,100
Holloway Bros.	2,175		

LONDON.—Accepted for providing materials and constructing new road at North Woolwich :—

Brunswick Rock Asphalte Paving Company £1,617

LONDON.—Accepted for providing and laying Brunswick rock asphalte paving in various streets for the Plumstead Board of Works :—

Brunswick Rock Asphalte Paving Co. (18,250 super yards) £3,000

LONDON.—Accepted for providing and laying Portland cement concrete and Brunswick rock asphalte, in Rosoman Mews, for the Clerkenwell Vestry :—

Brunswick Rock Asphalte Paving Co. £250

LONDON.—For stables, &c., at Burlington-road, Fulham, S.W., for the London General Omnibus Co., Limited. Mr. Percy W. Britton, engineer :—

Perry & Co.	£4,218	C. Wall	£3,465
Holliday & Greenwood	4,113	Parker	3,395
Downs	4,097	R. & E. Evans	3,389
Knight	4,069	H. D. Evans	3,345
Ansell	3,700	Wilkinson Bros. (accepted)	3,271
J. O. Richardson	3,570		

LONDON.—Accepted for shop-fittings at No. 132, Rye-lane, Peckham, S.E., for Mr. W. West. Mr. W. Burrell, architect :—

J. O. Richardson, Albert Works, Peckham £110 0 0

LONDON.—Accepted for fittings required at new Sorting Office, Cherry Orchard-road, East Croydon, for Her Majesty's Office of Works. Mr. John Tosh, architect :—

J. O. Richardson, Albert Works, Peckham £188 0 0

LONDON.—Accepted for painting and renovation to the Crystal Palace Station, for the London, Brighton, and South Coast Railway Company. Mr. F. D. Banister, engineer :—

J. O. Richardson, Albert Works, Peckham £1,979 0 0

LONDON.—For boiler-house, engine-house, &c., at Central Station Buildings, King's-road, N.W., for St. Pancras Vestry. Professor Hy. Robinson, M.Inst.C. & E.E., Engineer :—

Mowlem & Co.	£8,948 0 0	Steed	7,187 0 0
Wilkinson Bros.	7,579 0 0	J. O. Richardson, Albert Works, Peckham*	7,117 11 1
Munday & Son	7,536 17 7		
Pattinson	7,500 0 0		
Godson & Son	7,347 8 0		

* Accepted.

LONDON.—For alterations and additions to the Phœnix Brewery, Notting Hill, W., for Messrs. J. Campbell Johnstone & Co. Mr. J. Henry Richardson, architect, Shepherd's Bush. Quantities supplied by Messrs. Heelis & Wrightson :—

Chamberlen Bros.	£1,587	Scrivener & Co.	£1,383
Adamson & Son	1,497	Howell J. Williams	1,276
Courtney & Fairbairn	1,494	Atherton & Latta*	1,275

* Accepted.

LONDON.—For additions, &c., to residence, "Whetstone," for Mr. Stephen Grocott. Mr. F. Child, surveyor, 1, Station-road, New Barnet :—

		Reduction for suggested alteration of work.
F. Bedford Pitcher	£310 0	—
Wells & Son	289 0	£20 0
C. H. Binney & Co.	273 0	—
E. Crisp	265 10	6 18
Macfarlane Bros.	260 0	5 0
W. Ellwood	235 0	5 0
W. Pavey	195 10	5 0
Fred. Voller, Wood Green*	196 0	10 0

* Accepted.

LONDON.—For the erection of 100-ft. chimney shaft, reconstruction of boiler house and coal store, firebrick seatings to four steam boilers, and work in connexion, for the Lambeth Board of Guardians. Mr. E. H. Brewster, engineer :—

John Appleby	£2,870 0 0	Yates	£2,150 0 0
D. Smith	2,175 0 0	Neal	1,906 0 0

LUTON.—For the erection of residence near General Cemetery, for Mr. A. Bird. Mr. A. Wilkinson, architect, Cardiff-road, Luton.

Miskin	£1,100 0	Neville	965 0
Nelson	1,091 16	Dunham,* Luton	917 0
White	988 0		

* Accepted.

MACCLESFIELD.—For the erection of a steel girder bridge near Antrobus Hall, Great Warford and Mobberley, for the Prestbury and East Bucklow Highway Boards. Mr. Carswell, surveyor, King Edward-street, Macclesfield. Quantities by Mr. H. R. Price, architect, Manchester :—

Bettany	£215 0	Jno. Foden	£145 0
Massey & Son	192 10	Geo. Blackshaw, Mobberley*	144 0
F. Dawson	185 19		
Tate & Gordon	150 0		

* Accepted.

NEWCASTLE-ON-TYNE.—For alterations to the Tow Law Presbyterian Church and Manse. Messrs. Badenoch & Bruce, architects, 21, Pilgrim-street, Newcastle-on-Tyne :—

All Trades.

Macallum & Bates	£162 10 0	R. Burlinson & Co.	£153 14 3

Carpenter and Joiner.

N. W. Maughan	£127 7 10	Robt. Rawes	£105 5 0
Wm. Ridley	111 14 11	James C. Waugh, Tow Law*	90
R. Mitchison & Co.	106 16 10		

Slater.

Kirk & Dickinson	£81 19 0	R. Mascall, Bishop Auckland*	£52 7 0
Ed. Beer & Sons	79 17 8		
Charles Nicholson	59 12 0		

Painter.

John Campbell	£15 10 0	Charles Roberts, Tow Law*	£12 0 0
Adam Robertson	15 0 0		

* Accepted.

NEWBURY.—For additions to St. Mary's Schools, Newbury. Mr. James H. Money, architect.

Geo. Elms	£548 0 0	Samuel Elliott, Newbury (accepted)	498 14 10
A. H. Houghton	539 0 0		
E. C. James	499 0 0		

NEWCASTLE-UNDER-LYME.—For sett-paving Penkhull-street, Lad-lane, &c., for the Town Council, Mr. James Pattison, Borough Surveyor, Newcastle-under-Lyme:—

	Contract 1.	Contract 2.
F. Barke	£635 7 0	£553
Smith & Taylor, Basford, near Newcastle	624 0 0	48*
John Horobin, Cobridge, Stoke-on-Trent	580 0 0*	50
Borough Surveyor	598 0 0	44

*Accepted.

NEWPORT (Mon.).—For the construction of storage and intake reservoirs, tunnels, road-diversion, &c., for the Town Council. Mr. Conyers Kirby, C.E., Stow Chambers, Newport:—

Geen	£151,121	Watt & Willson	£122,150
Bell	149,461	Tempest	110,877
Allan	147,705	Gall	105,666
I. T. Firbank	141,155	London & Co.	97,998
Bond & Hitchcox	138,807	Young	94,596
John Aird & Son	129,737	Patterson & Co., Ltd.	92,620
Rutter	118,909	Jenkins	92,323
Lawson	118,150		

[Engineer's estimate, £96,170 10s. 4d.]

NORTHAMPTON.—For additions, &c., to vagrant wards, for the Union Guardians. Mr. J. A. Piccaver, architect, 7, Wood Hill, Northampton. Quantities by architect:—

A. J. Chown	£355 0	J. Garrett	£297 10
G. W. Souster	320 7	E. Archer	290 0
G. Branson & Son	305 0	R. Hickman	290 0
G. F. Sharman	303 0	W. Throssell	288 0
J. Dunckley	290 0	T. A. Fisher	286 7
J. M. Panting	298 0	Wilford & Judkin*	277 0

* Accepted.
[All of Northampton.]

NORTHAMPTON.—For forming, &c., roadway (Greenwood-road), for the Rt. Hon. Earl Spencer. Messrs. Jno. Ingman & Shaw, architects, 7, George-row, Northampton:—

Watkin Bros.	£925 0 0	Gregory	£778 0 0
Brown	813 15 7	Cosford	656 0 0
Hall	800 0 0	Green Bros.	648 0 0
Martin	794 0 0	Finnegan, Northampton (accepted)	635 0 0
Farmer	758 0 0		

NORWICH.—For granite paving certain streets in the city, for the Corporation. Mr. O. E. Winter, C.E., City Engineer *pro. tem.*, Guildhall, Norwich:—

Labour only.

	s. d.	
W. Griffiths	1 2	per sup. yd.
G. Hall	0 11½	,,
W. Wadey	1 4	,,
H. Burham, Dariaston (accepted)	0 10	,,
J. Speight	1 9	,,

100 *Standards of Deal for Wood Paving.*

Jewson & Sons, Norwich (accepted). £10 9 6 per standard
[marked W.R.W.

ORPINGTON (Kent).—For the erection of a pair of semi-detached cottages, for Mr. Joseph S. Doyle. Mr. Thomas Marsh, architect, Bromley, Kent.

Thompson	£770	W. Hockaday, Bromley*	525
Somerford & Son	598	Whitehead and Sager	495
C. Satchell	589	*Accepted,	

[Architect's estimate, £533.]

PARKSTONE.—Accepted for the rebuilding of the "Half Way" Hotel at Parkstone for Messrs. Hall & Woodhouse. Mr. H. F. J. Barnes, architect, Poole:—
W. J. Chinchen, East Cliff Works, Bournemouth £1,600

PEMBROKE DOCK.—For additions, &c., to school buildings, Llanion, Pembroke Dock, for the School Board of the Borough of Pembroke. Mr. John E. P. Ladd, architect, Main-street, Pembroke:—

Evans & Morris	£539 15	Charles Young, Pembroke Dock*	£345 0
Davis & Morgans	496 0		
Frederick Noakes	475 0		

* Accepted subject to approval of Education Department.

PLYMOUTH.—For the restoration of St. Mawgan-in-Meneage Church, near Helston. Mr. Edmund Sedding, architect, 7, Buckland-terrace, Plymouth.

Julian	£1,070
Eva & Richards (accepted)	940

PONTYPOOL.—For the erection of twenty cottages in blocks of ten houses each:—
D. Lewis, Llanithel £3,410 0 0

RAMSBOTTOM (Lancs.).—For forming, paving, kerbing, &c., Draba-street, Prince-street, and Strang-street, for the Local Board. Mr. Arther W. Smith, surveyor, Callender-street, Ramsbottom:—
Chas. Lomax, Higher Summerseat, near Bury* } Schedule of prices.

ROWRAH (Cumberland).—For the erection of Wesleyan church and school. Mr. A. Huddart, architect, 22, Lowther-street, Whitehaven:—

S. McWhinney	£941 10	R. & D. Pearson	£868 16
Chapple & Son	898 10	J. Green, Cockermouth*	859 0

* Accepted.

RUABON.—For the erection of gallery, &c., at chapel, Penycae, for the Committee of the Salem Baptist Chapel. Messrs. Owen Morris Roberts, architect and surveyor, 14, Bank-place, Portmadoc:—
John Williams £375 15 0
John Thos. Jones, Cefn-Mawr, Ruabon (accepted) 389 0 0

RUGBY.—For making up 142 yards run of new street, with sewers, &c., for the Freehold Land Society. Mr. John T. Franklin, architect and surveyor. Quantities by J. T. Franklin:—

Porter	£896 0 0	Jewel	£660 0 0
Holme	776 2 6	Young	632 0 0
Hollowell	662 6 8	Hall, Rugby*	624 15 0

* Accepted.

RUGBY.—For additions, &c., to public offices, Windmill-lane, for the Local Board. Mr. J. H. Brierley, Surveyor, Rugby:—

J. Young	£170 0 0	W. G. Satchell, Chapel-street, Rugby*	£124 15 7
J. Hollowell	156 11 4		
A. Harris	154 16 1		

* Accepted.

SPILSBY.—For the drainage of Wainfleet. Contract No. 3. Mr. J. E. Butcher, District Surveyor, Spilsby. Quantities by Mr. J. Watson, Hull:—

Siddons & Freeman	£2,898 0 0	T. Elmes	£2,996 18 6
S. & W. Pattinson	2,878 10 0	J. T. Turner, Wainfleet (accepted)	2,296 10 0
J. Crawshaw	2,695 11 0		
B. Hibbitt	2,595 14 0		

STRETFORD.—For the erection of forty dwellings, for the Local Board. Quantities by Mr. John Bowden, C.E., John Dalton-street, Manchester:—

Wilson & Toft	£5,090	W. Brown & Son	£4,837
B. Powell	4,988	Wm. Thorpe, Chester-rd.*	4,819
Jas. Byrom	4,913	* Accepted.	

TEDDINGTON.—For Baptist Church, Teddington. Mr. John Wills, architect, Derby:—

Holliday & Greenwood	£3,443 0	Walker & Slater	£3,040 0
Higgs & Hill	3,398 0	J. Piller & Sons	2,994 0
J. F. Collinson	3,206 17	D. Stewart, Wallington, Surray*	2,918 0
W. H. Gaze	3,159 0		
W. Johnson & Co., Ld.	3,135 0		

* Accepted.

THAME.—For supplying and laying 3,000 feet of pavement, High-street, for the Local Board. Mr. Henry Howland, surveyor, Thame.

	Victoria Stone.	Croft Stone.	Victoria Indurated Slabs.
J. Tree & Sons	£180 10 0	£171 0 0	—
W. Lee	157 12 0	149 12 0	—
Wells & Son	130 0 0	180 0 0	—
Victoria Stone Co.	158 0 0	—	—
Croft Stone Co	—	140 6 8	—
W. Gibbs	—	—	168 15 2
W. Howlands, High-street, Thame*	—	140 10 0	—
Surveyor's estimate	150 0 0	135 0 0	—

*Accepted.

THEYDON BOIS (Essex).—For additions, &c., to Parochial School, for the Committee. Mr. Jas. Winter, architect, Epping:—

Palmer Bros.	£360	W. Pavey	£295
White & Son	332	T. Keen, Theydon Bois (accepted)	245
W. Lawrence	298		

TWICKENHAM.—For four cottages in the Fourth Cross-road, Twickenham. Mr. F. D. Holmes, architect:—

Wilcox	£680	Potter*	£600
Lock Bros.	650		

* Accepted.

TWICKENHAM.—For six cottages in Albion-road, Twickenham, being the first portion of the estate. Mr. F. D. Holmes, architect:—

Thompson	£970	Wilcox	£915
Hancock	940	A. Collis*	903
Hurst & Co.	921		

* Accepted.

WALTHAM CROSS.—For erection of shop, &c., at Waltham Cross. Messrs. Wigg, Oliver, & Hudson, architects:—

J. Bennet	£1,903	J. Bentley	£1,781
W. Shurmur	1,825	W. Gardner	1,758

WALTHAMSTOW.—For new premises at High-street, Walthamstow, for Messrs. Fish & Co. Mr. A. A. Tween, architect.

Woodward & Co.	£2,680	H. Wall & Co.	£2,417
J. Jollife	2,515	J. Pocock	2,135
W. Shurmur	2,466		

WICKFORD (Essex).—For the enlargement of the parish schools. Mr. F. Whitmore, architect, Chelmsford. Quantities by architect:—

H. R. Rons	£517 0 0	J. Gozzett	£445 0 0
W. J. Payne	510 0 0	J. Elgie	439 0 0
J. Smith	485 0 0	W. Letch	425 0 0
F. Johnson	461 10 0	J. Rayner, E. Hannigfield*	395 0 0
G. Clarke	456 14 3		
W. Ansell	455 0 0		

* Accepted.

WINDSOR.—For new Conservative Club, Windsor. Mr. S. M. Wyborn, architect, Windsor:—

	Alterations, repairs, &c.	Hot water.
Goddard & Son	£2,500	£54
Hollis & Son	2,199	65
Akery	2,186	52
Deverill	2,100	51
Watson	2,090	57
Reavell	2,012	58

WITHERNSEA (Yorkshire).—Accepted for providing and laying skating-rink at Withernsea with 6-in. concrete and Brunswick rock asphalte:—
Brunswick Rock Asphalte Paving Co. (1,110 super. yards) £350

WYMINGTON (Northants.).—For providing, laying, and fixing 2,309 yards cast-iron socket mains, with hydrants, &c., near Rushden, for the Parochial Committee. Mr. Reginald E. Middleton, C.E., 17, Victoria-street, London, S.W.:—

H. Roberts	£550 4 0	J. Keuchington	£475 12 4
Straker & Whitworth	540 0 0	Clay Cross Co.	443 9 2
H. Shardlow	526 5 0	J. Willmott	434 0 0
J. H. Vickers	501 5 3	Peattie & Axtell, Oxford (accepted)	408 8 6
Hughes & Gotto	485 13 0		

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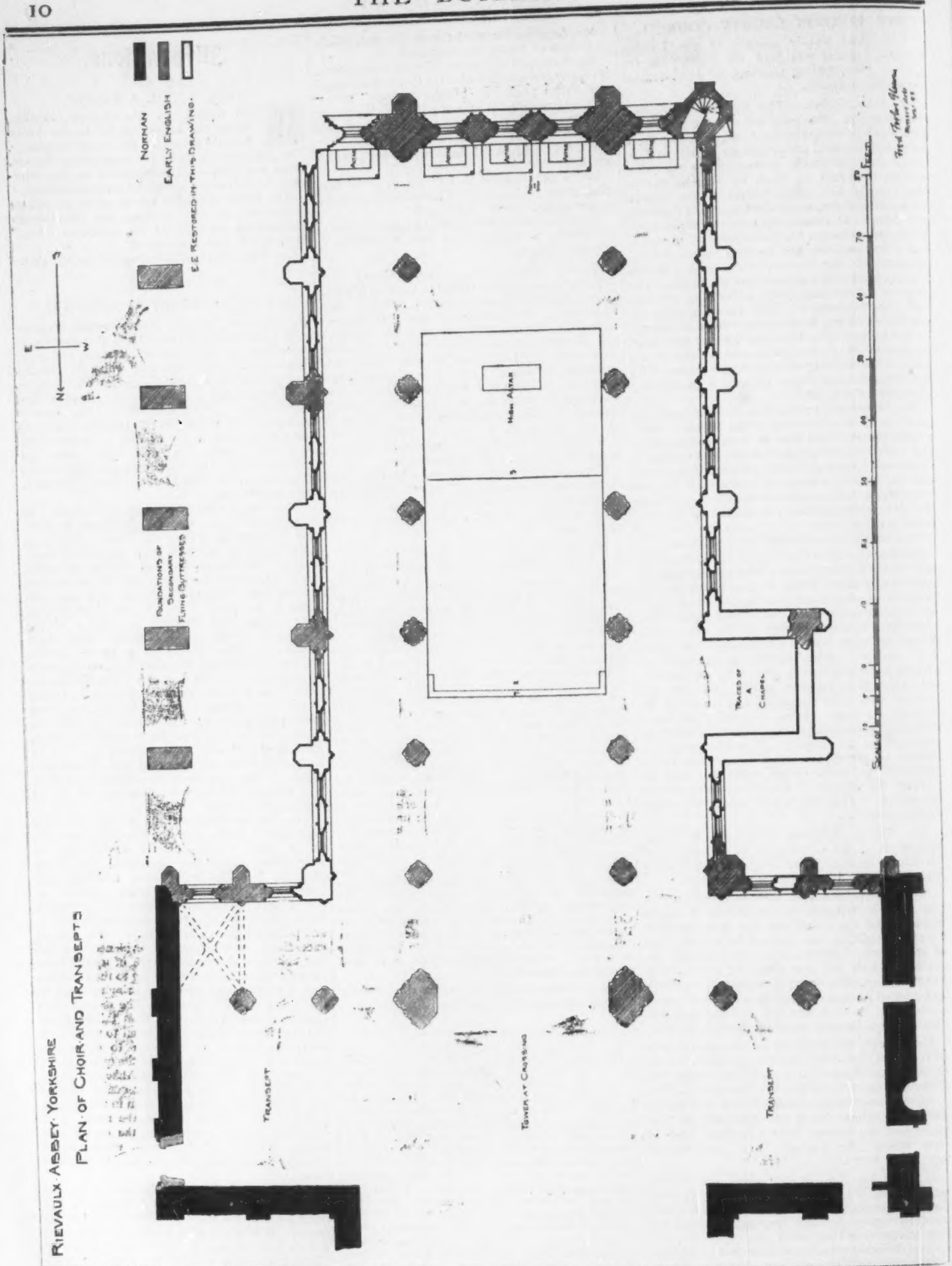
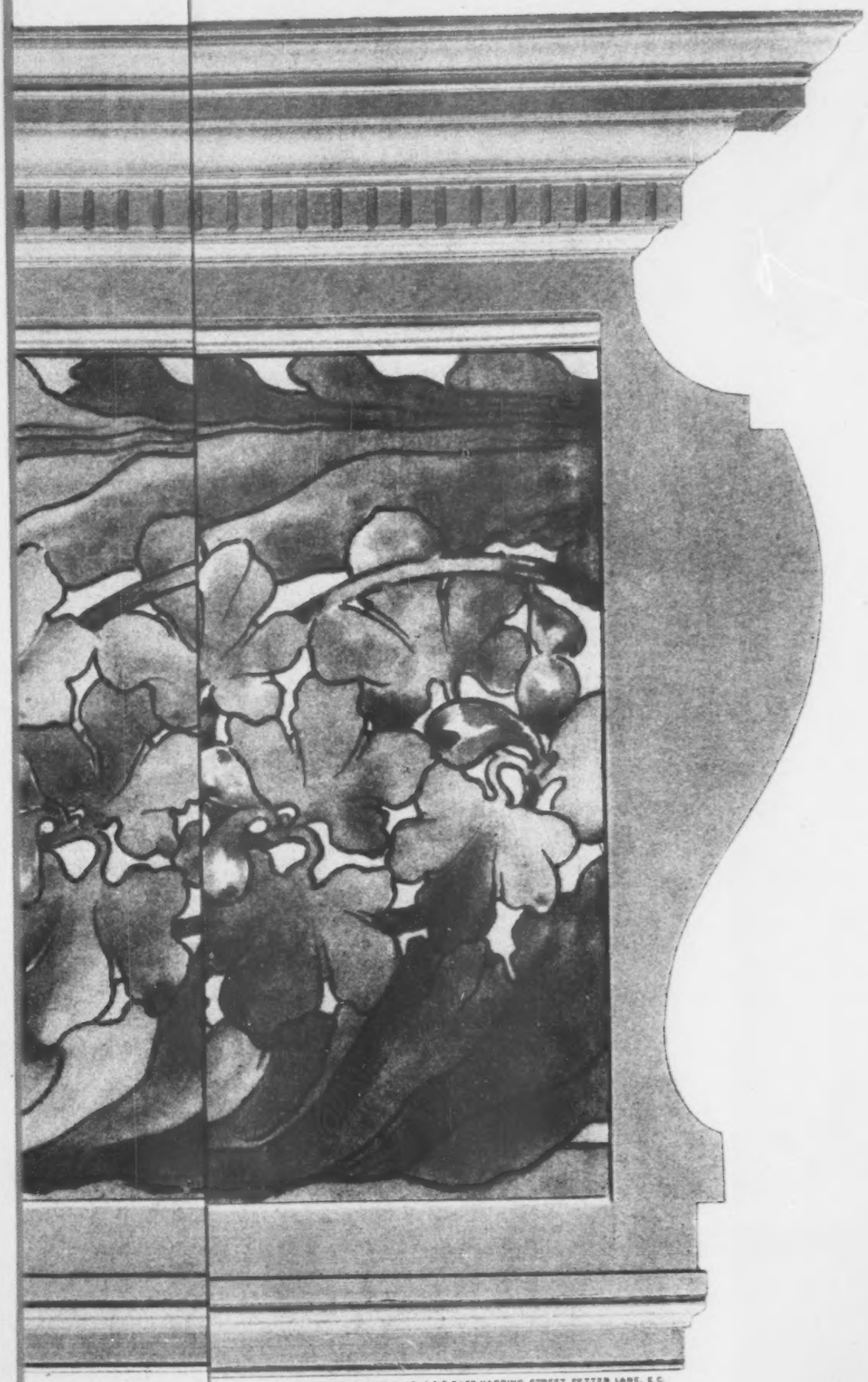


RIEVAULX ABBEY, YORKSHIRE
PLAN OF CHOIR AND TRANSEPTS

learn much valuable information as to their condition, their furniture, and the uses to which they were put. These particulars will be more conveniently discussed with the account of the buildings.

Although nothing else is left of the first church than the ends and west sides of the transepts, and part of the south wall of the ruined nave, its plan and arrangements can easily be made out. The eastern sides of the transept and the presbytery have been rebuilt, but there is little doubt that their plan resembled that of Kirkstall, an aisleless presbytery of two bays, flanked by three chapels on each side, opening out of the transept and separated by walls. The nave was nine bays long. The monks' choir occupied the crossing and, perhaps, two bays of the nave, and a third bay formed the retro-choir. The rest of the nave was the choir of the *conversi*, or working brothers. The aisles were shut off by continuous walls, against which the stalls of the *conversi* stood; but long before the suppression the *conversi* had died out, their choir had been cleared away, and the aisles cut up into chapels, four on the north and two on the south side. The fortunate incorporation of much of the old work when the transepts were rebuilt enables us to see that the architecture was of the severest possible type, with the plainest of round-headed windows and the simplest of string-courses, as in the corresponding work at Fountains. The nave, perhaps, retained its Norman character to the end, for the Survey speaks of the "selyng of the roof painted" (perhaps like that at Peterborough), and of a clearstory of "xviii. lights of square stone." The west window seems to have been one of many lights, probably a Perpendicular insertion, for the Survey directs the stone, iron, and glass "to be taken down safely . . . and to be bestowed in Helmsley Castell, and the charge of takyng down thereof is iij li. xiiis. iiijd." At the west end of the nave was a porch or Gallee, extending the width of the front, as at Fountains and Byland, described in the Survey as "the house or portche at the west end of the Church."



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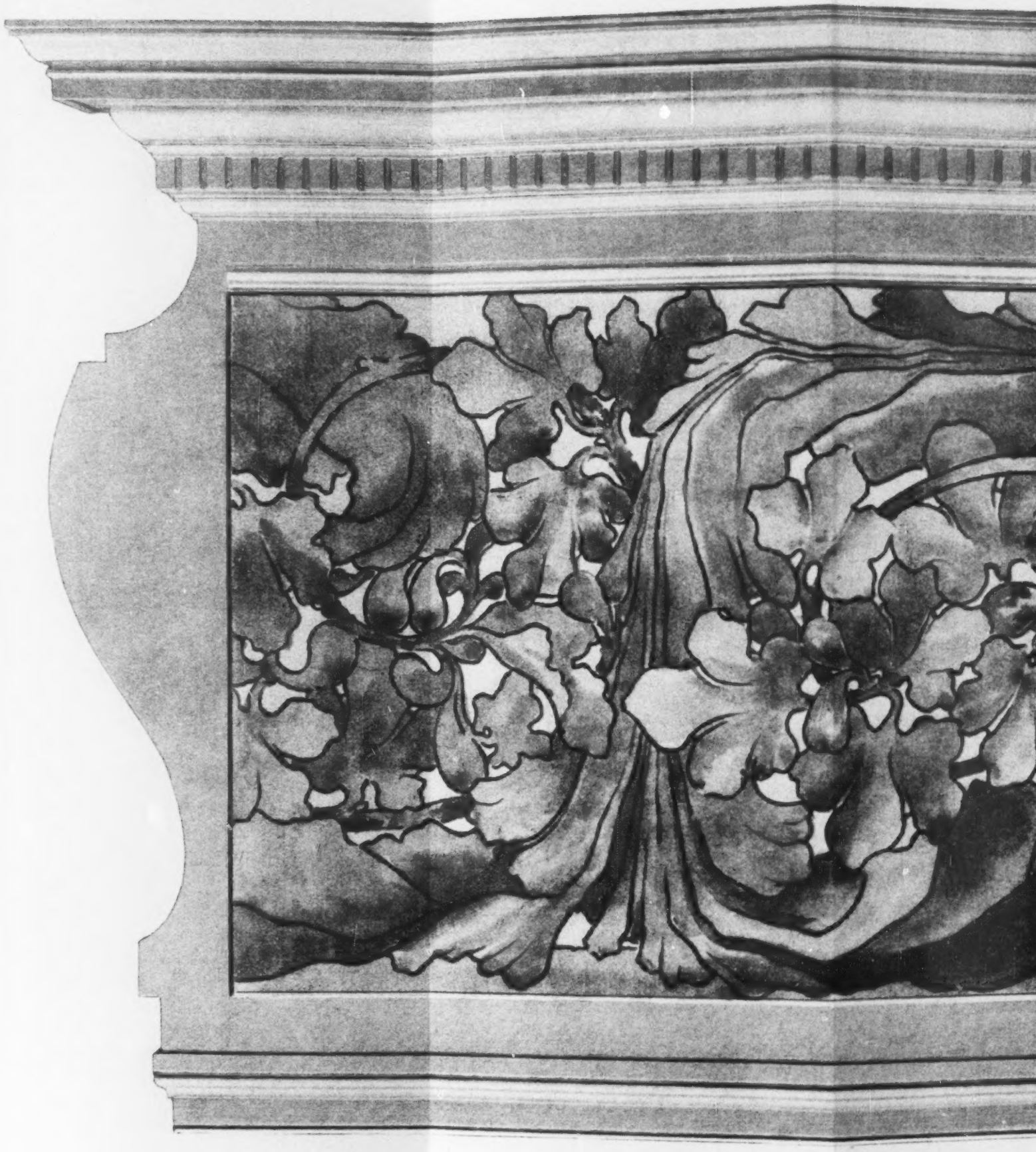
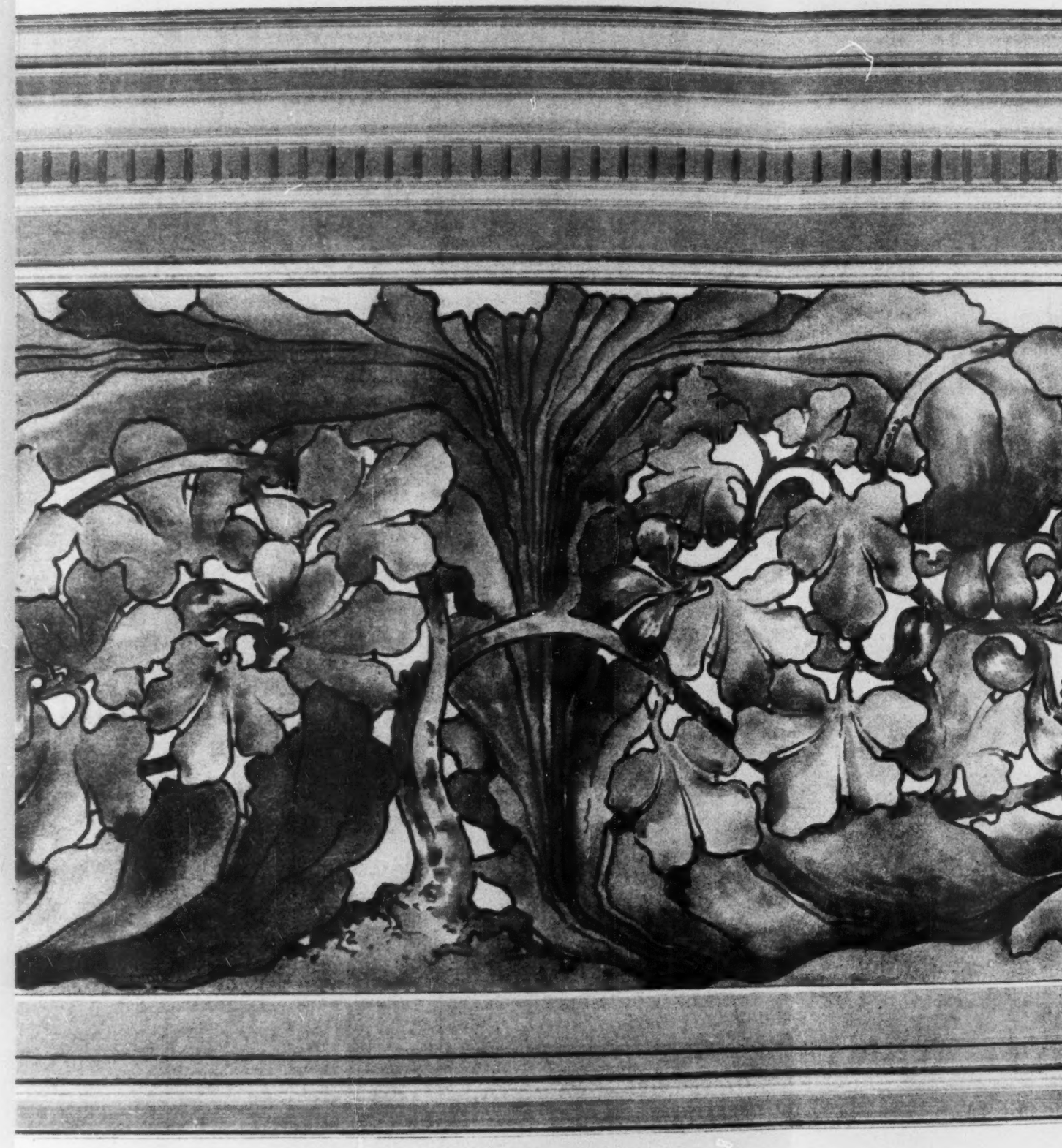


Royal Academy Exhibition, 1894.

DESIGN FOR A FRIEZE.—By Mr. Arthur Gwatkin.



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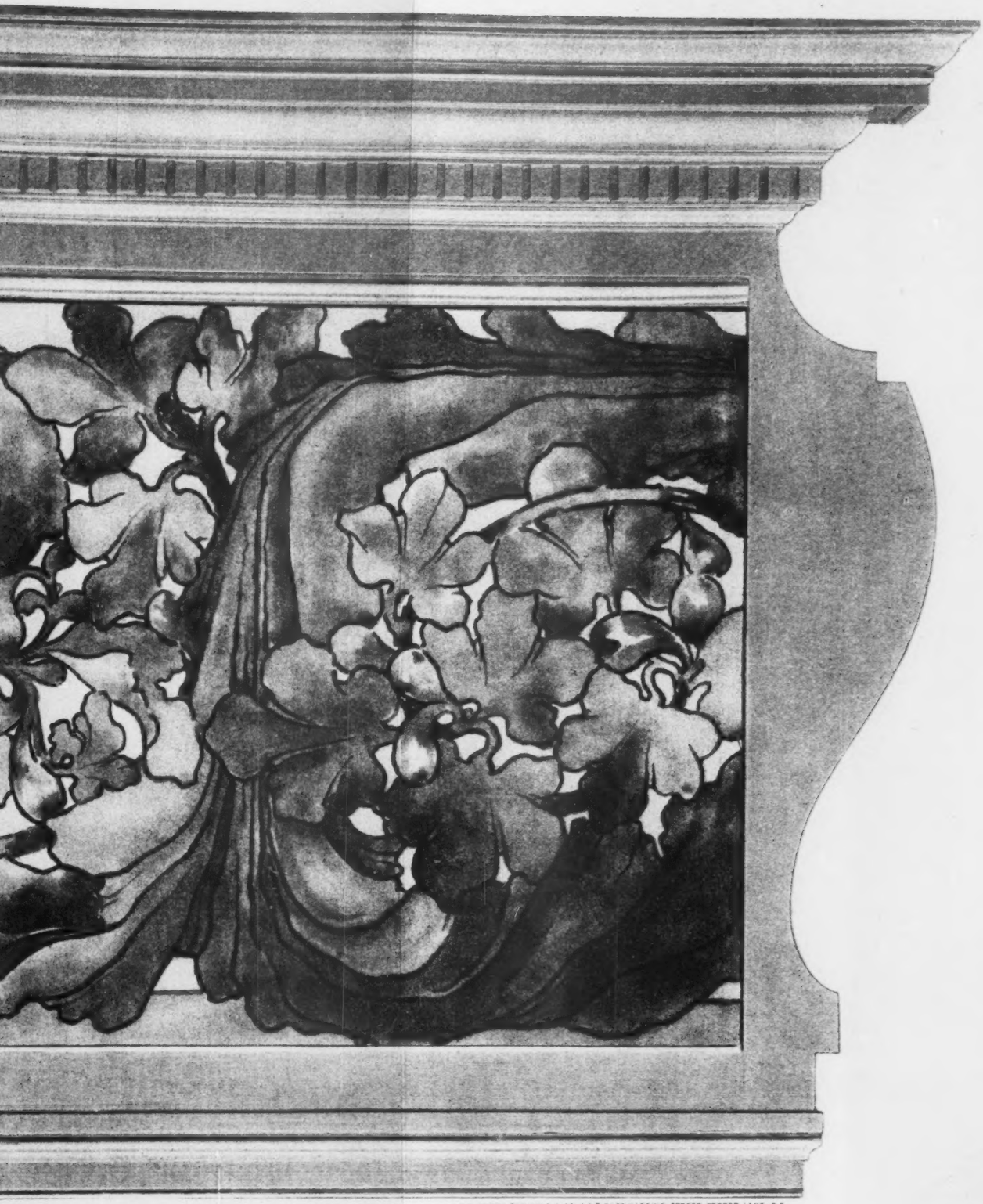

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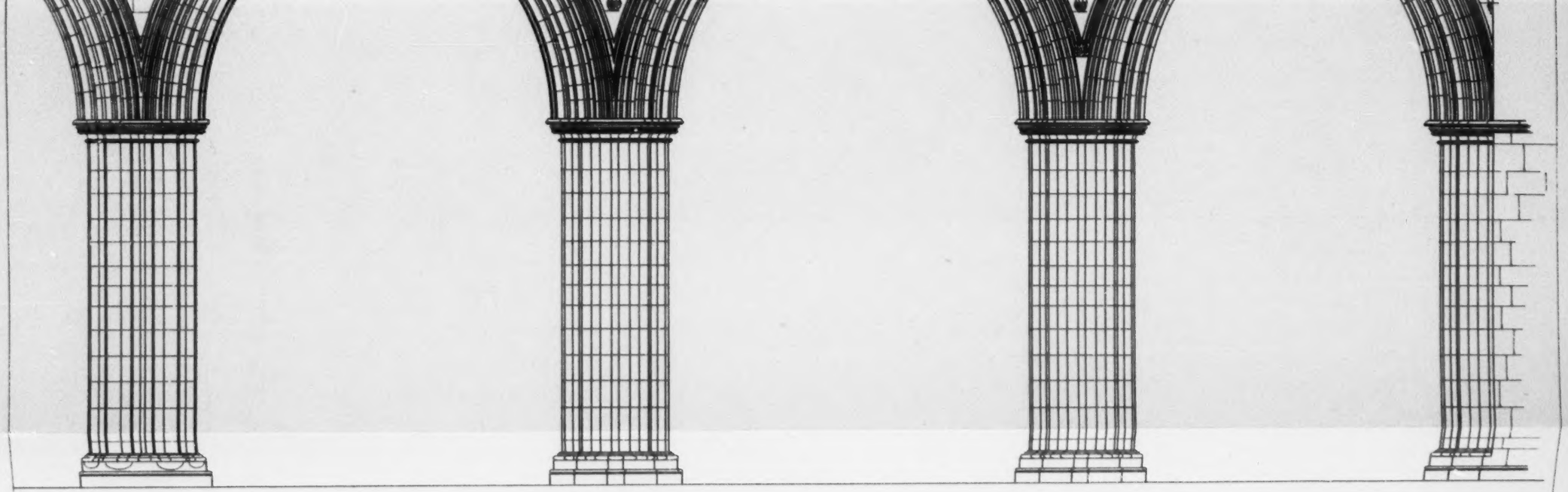
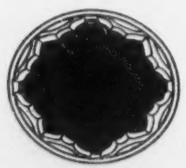
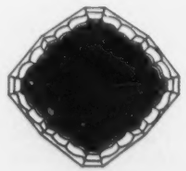


ELEVATION
OF
THREE BAYS NEXT TO CROSSING

Note. There are no detached shafts left in any part of the building





PLAN

Fred Forbes Glennie
Measured 1870
Sept 14th

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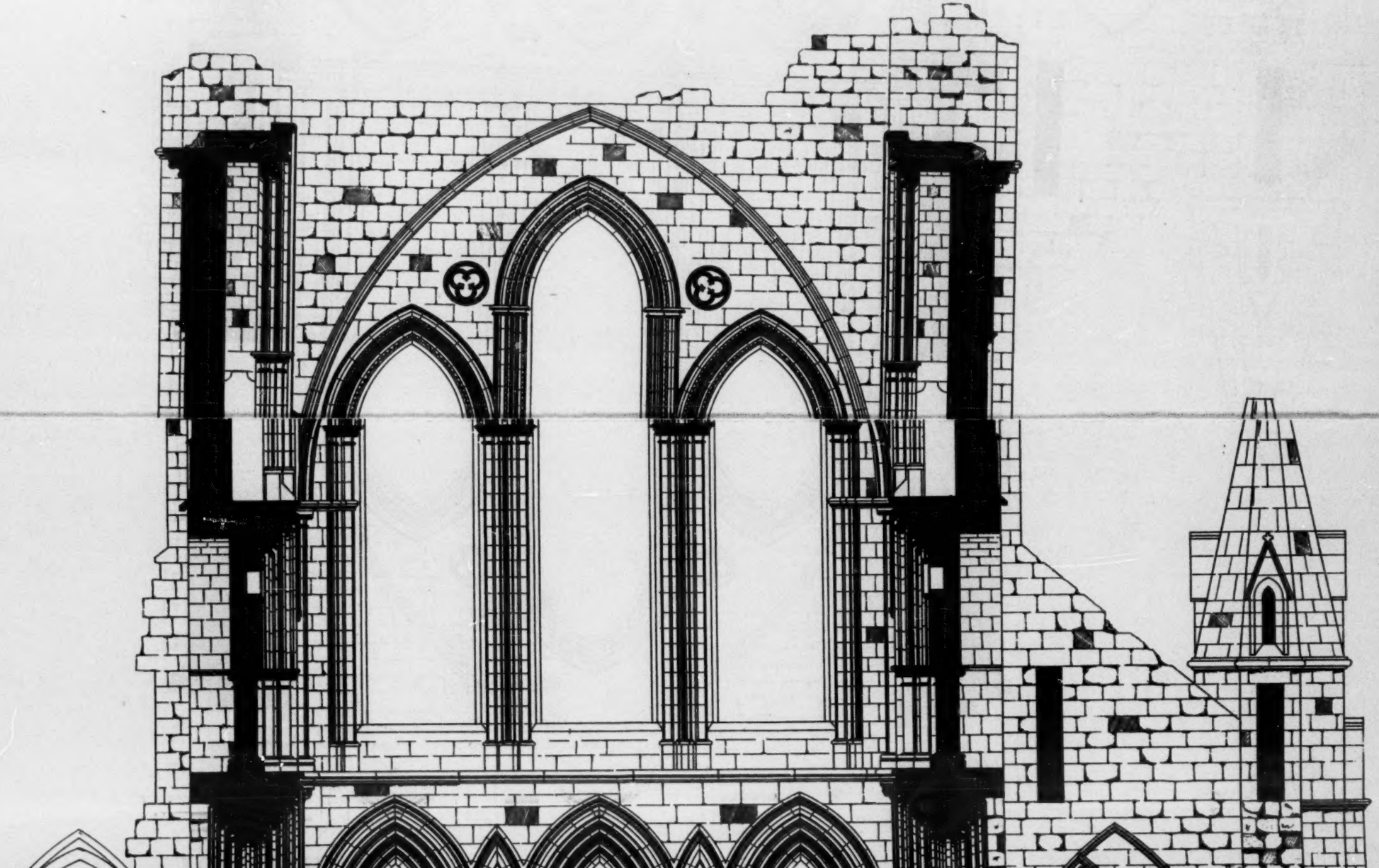
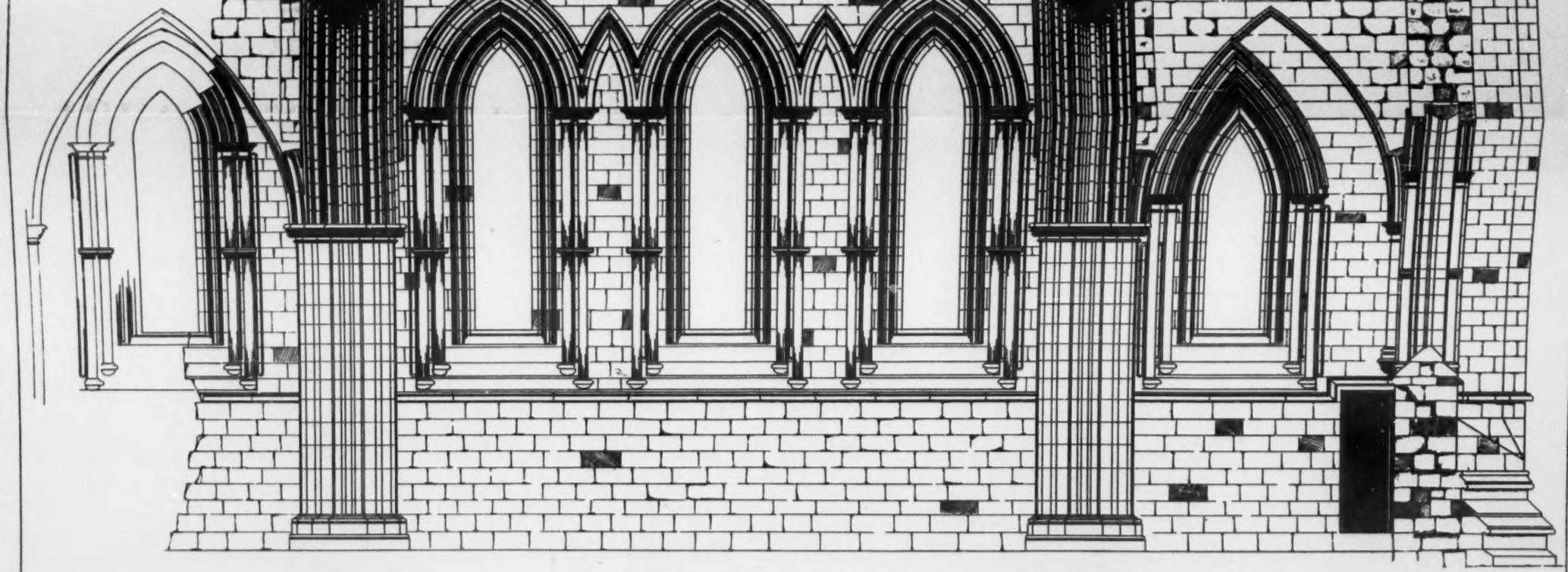
THE ABBEYS OF GREAT BRITAIN.—No. 2. RIEVAULX.

THREE BAYS OF CHOIR.—Measured and Drawn by Mr. F. F. Glennie.

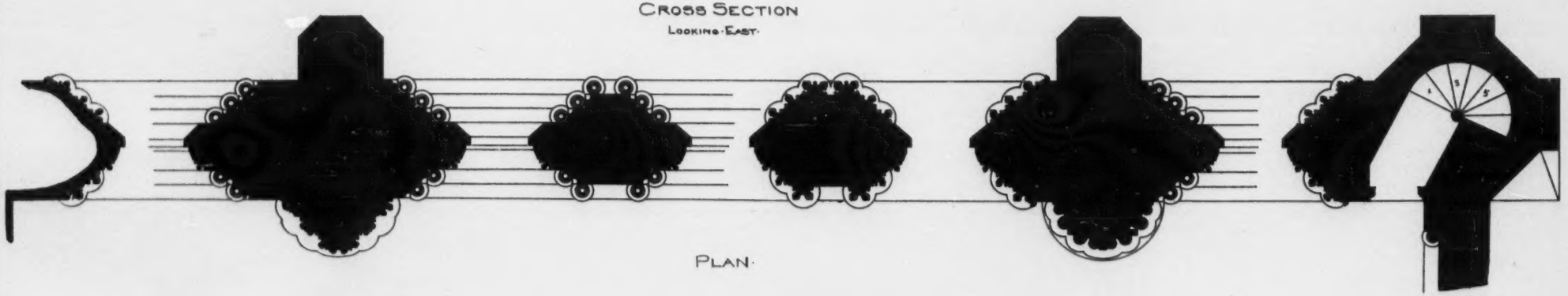
RIEVAULX ABBEY

YORKSHIRE





CROSS SECTION
LOOKING · EAST ·



PLAN ·

SCALE OF 0 1 2 3 4 5 10 15 20 25 30 FEET ·

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THE ABBEYS OF GREAT BRITAIN.—No. 2. RIEVAULX.

SECTION OF CHOIR AND INTERIOR ELEVATION OF EAST END.—MEASURED AND DRAWN BY MR. F. F. GLENNIE.

A pair of semidetached Houses in the Melbury Road, Holland Park. Halsey Ricardo Archt.

Royal Academy Exhibition, 1894.

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